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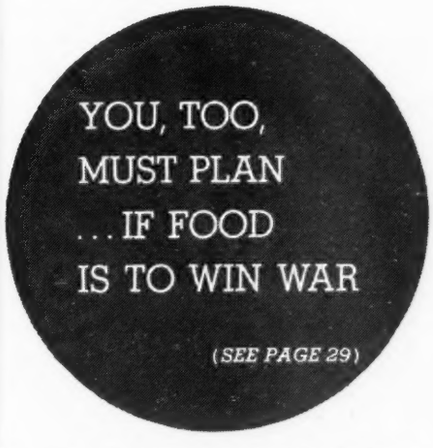

To make good the slogan, "Food Will Win the War and Write the Peace," two things must be done. The first is the organization of a central committee in Washington to look after the defense requirements of the food industry, as pointed out by "Food Industries" last month. But that alone will not do the job. For food processors must also plan their operations in accordance with developments if Uncle Sam's food program is to be adequately effective. So important is this need that the cover is used to call attention to an editorial on the subject on page 29.

FOOD INDUSTRIES

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This Issue

Go To The Chem Show

Every production executive, technologist and engineer in the food industries should attend the 18th Exposition of Chemical Industries. More than half the exhibits will be of equipment and materials useful to the food processing field. New machines, new materials, new ideas will be found on every side. For brief descriptions of many important exhibits see pages 33 to 44.

Workers "Frame" Process

You can't exactly blame a man for trying to protect his job, but misguided effort in that direction sometimes throws monkey wrenches into a new process. And it did just that in the case of a continuous method for making cranberry jelly. But the problem was worked out, the dilemma dehorned, and everybody made happy. How it all happened not only is an interesting story, but it puts the finger on a labor relations problem any food manufacturer may face. Turn to page 48 and let Dr. G. T. Reich, technical director of Pennsylvania Sugar Co., tell you about the human side of starting a continuous process.

Necessity Has Twins

For a long time the South and Southwest have produced twice as many perishable foods as they could market economically. The answer for which situation started the University of Texas on a research program to develop a low-price, effective quick freezer. This research not only produced the kind of freezer needed but it developed a new freezing process, the polyphase system. There's a lot of technology wrapped up in this development, and it's all explained by W. R. Woolrich, dean of engineering, and Luis H. Bartlett, mechanical test engineer, both of the University of Texas. See page 60.

Background for Rapid Growth

Probably no branch of the food processing industries ever before experienced such a rapid expansion as the egg drying industry is now about to complete. Beginning last summer, the industry faced the problem of expanded output by more than 1,200 percent.

Under such conditions, operators of egg drying plants will need all the information about the industry, its requirements and methods, that can be gathered. A goodly portion of this information will be found in the article beginning on page 50. The author, H. A. Mulvany, has had much experience in the egg processing field.

Coming

Plant Trips by Camera

It's well known that one industry can borrow valuable ideas from another, just as the idea for the famous automobile assembly line came from the disassembly line used in the meat packing industry. And it's a further fact that many unit operations and processes are common to the various food industries. These things being true, you can learn a lot from what the other fellow in the food field is doing. And with the aid of the camera, FOOD INDUSTRIES will show you what he is doing. These "picture plant tours," which start in this issue, page 56, will continue in future issues.

What To Do About pH

Most fruits vary in chemical composition and texture from year to year. And if the fruit breaks down readily on heating, as happens in some seasons, it has been the practice to modify the process. In this connection, an important factor is the pH of the product. Which makes of particular practical value an article to be published in January on the control of pH in canning acid products. The authors are C. T. Townsend, of the University of California's laboratory for research in the canning industries, and M. J. Powers, of the Western Branch Laboratories of National Canners Association.

What's What in Dehydration

Dehydration is favorably considered by many as a means of preserving food during the emergency. And dehydration technic for many foods is far advanced. With vegetables, however, the case is different. Existing knowledge of vegetable dehydration is not yet widespread. Therefore, FOOD INDUSTRIES is pleased to begin in January the presentation of a report by W. V. Cruess and E. M. Mrak on vegetable dehydration. These men at the University of California Agricultural Experiment Station have investigated all phases of the industry.

"Fortification" of Butter

Because butter is the only food defined by a law of Congress, and because that law makes no provision for vitamin addition, the seasonal variation in the vitamin A content of butter is a problem hard to overcome. However, studies carried out at Purdue University have shown that a carefully selected winter diet for cows will help to keep the vitamin A content of butter steady throughout the year. Results of this study by Prof. S. M. Hauge of Purdue will appear in an early issue of FOOD INDUSTRIES.

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FOOD INDUSTRIES
FOR THOSE WHO CONTROL QUALITY
THROUGH MANAGEMENT AND PRODUCTION

LAURENCE V. BURTON, Editor DECEMBER, 1941

Food Processors Must Also Plan

AS the Office of Production Management enlarges the scope of its operations and begins to hit its stride, it is becoming apparent that food processing and preservation are gradually assuming their proper place in the government's plans to defend the Western Hemisphere and extend all possible aid to those nations which are defending themselves against the aggression of the Axis powers.

Must Have a National Economy

For the past 22 years we have been accustomed to the ways of peace. We have been thinking for ourselves, acting for ourselves. The primary motive has been the traditional profit motive of the free enterprise system. By habit we in the United States have never developed any noticeable consideration for a national economy. Heretofore the nation's economy has been the sum total of all the little things that resulted from the plans and efforts of individual men. But that habit is soon to be changed, and with its change will come all the discomfort or anguish that is commonly associated with changing of customary ways of life.

OPM To Make Broad Plans

Total war, 1939 to 1944(?) model, requires total defense. It is no mere phrase that total defense needs centralized planning. A nation at war cannot be efficient without centralized planning. War-time conditions therefore place a huge burden on OPM to do far more than marshall the armament industries into a coordinated mechanism. Total defense also involves supply of the needs of the civilian population of our own nation and those to whom we are extending aid. And civil needs for most things, other than weapons, are about 20 times the size of military needs.

Properly, the OPM has first gone after armament production, which is more difficult to get started. It is now ready to tackle the problems of production of essential civilian supplies, in which food takes a most important place. But OPM cannot be expected to do much more than to plan far enough ahead to insure that ways and means are to be made available in adequate time to meet the predictable problems of the changing future.

But Industry Must Act

OPM is hardly to be expected to manage or operate industry. Industry must continue to operate its own plants, all in conformity with general policies to be carefully studied out by OPM. This policy study was urged on page 29 of the November, 1941, FOOD INDUSTRIES.

Initiative will still rest with industry. The food industry must be ever alert to the problems, needs and the opportunities ahead. OPM must do the advanced planning, at least two years ahead. It should foresee or procure the solutions to anticipated problems and accurately calculate the needs that will arise for their solution. Thus, it will have done its most important job. It will be on the basis of those calculations that the food processing industry should be granted the priority ratings to get itself ready in time to meet all possible emergencies.

It will be impossible, however, for any group of men in Washington to produce detailed solutions of the industry's problems long before they arise. All that may be expected is the broad consideration and long-range calculation of the basic methods of adapting ourselves and our respective branches of the food industry to future eventualities. In the event of realization of any predictable eventualities or important changes in the world situation that may affect the food processor, the responsibility for

change must perforce rest upon the manufacturer himself acting in cooperation with his suppliers.

This warning is necessary. No one should place too much confidence on the existence of centralized planning. Planning is not action. The action must come from industry. All that planning by OPM can accomplish is to visualize the best solution with the means available and to see to it that those means are made available for accomplishing the imperative change.

Central Planning Essential

Plans for the proper magnitude of expansion of certain branches of food processing must be made in Washington by OPM. Such plans must exactly dovetail with the plans for expansion of raw food material production by the U. S. Department of Agriculture. It may take only one year to produce a crop expansion, yet it may take much longer to get the processing equipment in place unless prompt provision is made for its erection in time. And, if the timing is wrong, huge quantities of perishable foods may be lost.

Problems We Might Face

The sort of future problems that might arise, and for which proper advance planning is vital, are matters such as these: Suppose that the Axis powers should occupy all of Northern Africa and that no cork at all would come to the United States. Cork liners for bottle closures, cork insulation and all civil uses of cork would be absolutely cut off—not merely drastically restricted. Suppose also that a substitute for cork liners should be available, right about now, but that it could not be produced in adequate amounts for a long time to come without granting priorities for the new processing equipment. Such equipment might require steel, brass, stainless steel and cast iron, all of which are vitally needed for armament production. Action based on long-range planning would need to be initiated at once if the Axis powers conquer Northern Africa (and provided also that the hypothetical cork substitute is actually a possibility).

Or take a case where alternative procedures are known to exist. Assume that Japan succeeds in the conquest of the Malay states and most of the Dutch East Indies, or even only blockades their shipments of rubber and tin to the United States. We have on hand about five months' supply of rubber and about a year's supply of tin. What should be the proper moves of the food processor or his sources of supply to continue to preserve perishable foods in adequate amounts, and where will he get the necessary new equipment and supplies unless OPM thoroughly understands the urgent needs and grants priorities in time?

Yet what good would be the last named action unless the food manufacturer and the equipment and supply manufacturer are likewise ready to go into action with proper and adequate plans?

Three-cornered cooperation is necessary, and it cannot be said that any one of the three is less important than the other. OPM must be ready to give the right of way in the proper direction. Suppliers of equipment and supplies must be ready to do their part in creating the materials and facilities. And food manufacturers must be ready to utilize the substitute materials or substitute processes for continued preservation and production of essential food. If the food processor falls down on his end of the job through lack of technical knowledge or advance thinking it will be just too bad.

While it is realized that many a food factory is managed by men of vision, wisdom and technical knowledge, it is likewise true that the food industry also includes some less-gifted individuals. If OPM were to be able, not only to clear the track, but also provide technical instructions should an emergency arise, it would be ideal.

Planning Is Insurance

Any planning carried out by the food industry should be done with somewhat the same spirit that one buys accident or public liability insurance: The insurance coverage will not avert a possible disaster, but it will avert the financial losses that may accrue to the insured as a result of such hypothetical disaster. While soundly conceived plans and vigorously prosecuted research based on those plans are the basis of insurance against corporate losses—just in case—they also have a larger and broader national implication. For it is inevitable that the entire national and interallied war future is dependent for successful outcome on many indispensable industrial products, of which processed food is as important as any other.

In case you feel that these are needless promptings just recall that Russia has lost about half of her best farm lands and has only food enough left for about a year. Whatever you think about Russia, you must admit that it is to our advantage to keep Russia fighting. And there is always the possibility that England may have an exceptionally poor crop yield. Few persons can yet visualize the future demands or potential production problems that lie ahead.

Nothing will take the place of cooperation between OPM, equipment and supply manufacturer, and food processor. And fortunate, indeed, will be the food manufacturer who has in his employ a competent food technologist.

All of us hope we will not be forced to adopt new processes, new materials or new ways, but it would be national folly to fail to be prepared to do so.

K V Burton

EDITOR

The Talk of the Industry

Salvage Your Waste Paper

Everybody should lend every form of cooperation to salvaging every scrap of waste paper. Here is one commodity that can be remanufactured again and again. Even though unwise price ceilings on waste paper, imposed by Office of Price Administration, may deter waste paper dealers from coming after your stuff, it is farsighted policy to accumulate it anyhow. For unless paper salvage is vastly increased there will soon be important restrictions on uses of paper.

Bugs in Our Grain

Henry A. Wallace's "ever-normal granary" was a toothsome phrase when he was Secretary of Agriculture, but since he has become vice-president our ever-normal granaries have become so infested with insects that the Millers' National Federation has been forced to employ an entomologist to assist the millers in coping with the bug problem. Weevils are no respectors of persons, least of all Mr. Wallace, and the fears of those who predicted trouble from the long storage of grain are, alas, materializing at a most inopportune time.

The Food & Drug Administration, no longer under the jurisdiction of the Secretary of Agriculture, is pouncing on infested cereal products with unrestrained zeal. Cereal processors are facing such aggravated bug problems that many of them feel the seller of infested grain is the

party who should be held responsible for F&DA seizures.

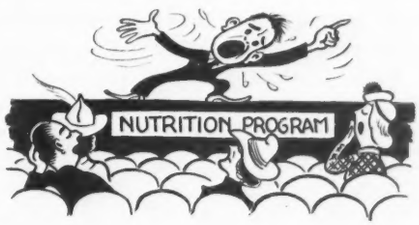
Gossip in the trade has it that county agents, on finding infested grain under government loan, will call the loan, thus forcing the grain and its bugs into channels leading to industry, which does not merit any condonation from the Food & Drug Administration. F&DA is reliably reported to be quite stony hearted about bugs. Maybe Paul V. McNutt and Claude Wickard can get together on this problem. But it is obvious that an overhaul of grain storage and transportation methods under the ever-normal granary policy has long been overdue.

Is Nutrition Program Bogging Down?

It must be apparent, even to the Federal Security Agency, that something is wrong with the new national nutrition policy so enthusiastically launched by the National Nutrition Conference for Defense in May, 1941, under the aegis of Dr. Russell M. Wilder. If Dr. M. L. Wilson, whose function it is to spread the gospel, or Dr. Thomas J. Parran or Paul Cornell took note of the character of the audience at the recent convention of Associated Grocery Manufacturers of America, they must have become aware of an important symptom. During the afternoon devoted to the nutrition program, the audience was not more than half capacity, and two-thirds of those present were domestic scientists, writers and the like. Food manufacturers were a small minority, and those who stayed to the end looking for tangible ideas failed to find them.

They heard that there is "plenty of gold in them thar nutrition hills for everybody." They heard that only "natural" foods are needed by the people for adequate nourishment, that enrichment is but a passing episode, not to be depended on in the long run. And they heard that the vitamin theme song is passé. Also that the customary advertising method is not the correct method to sell nutrition, that nutrition advertising is not brand advertising. As we sum up the results of that session, the food manufacturer is apparently expected to help sell the public on better eating but should encourage people to eat only natural foods (by the way, what is a *natural* food?) and should never put in a plug for the manufacturer's own contribution to improved nutrition.

In other words, the manufacturer appears to be expected to donate costly advertising space or radio time to encourage the public to consume unbranded food, a form of altruistic



generosity that is unlikely to find enthusiastic response.

If the gentlemen from Washington noted the character of the audience and the absence of the bulk of the manufacturers, they must surely have realized that manufacturers were not particularly interested in listening further to a confused plan.

Plainly, if the Federal Security Agency expects noticeable cooperation from the food industry, it must be supplied with a plan of cooperation that is sound from both viewpoints. There is need for more searching inquiry and long-range thinking in Washington if the National Nutrition Program is to go forward with the support that it needs.

Six Reasons for Visiting The Chemical Show

Manufacturers of processed foods face problems today that are unlike anything in their previous experience. Even the days of 1917-1918 are not comparable in their problems, for today the United States is committed to supply almost half the world with everything it wants—including food—and is facing today a coalition of powers far more formidable than those of 24 years ago.

Possible future restriction of supplies, whether because of hostile acts, lack of ships or inability to get supplies or equipment because of the needs of armament industries, will be the basic cause of most food manufacturer's problems. Furthermore, you must not overlook the

impending scarcity of labor, for it is impossible to create an Army and Navy of the size planned and also supply half the world with the matériel of war without depleting much of our existing labor forces. For the food manufacturer it is essential to comprehend the necessity for expanding the production of processed protein and protective foods in exportable form.

Add to the foregoing the fact that Washington is of the opinion that some forms of industry are likely to be forced out of business by lack of supplies and equipment, and you have a situation that should cause many a manufacturer of foods to wonder what his place or reason for existence shall be in the troublesome days to come.

Firms that are in standardized lines where the equipment, processes, formulas and plant layout are available to anyone with cash, where the owner merely supplies the requisite business management and contributes almost nothing else, whether it be new ideas or technology, are in the greatest danger. If you can justifiably regard your business as a "trade" you may be certain that the field is crowded, and that Washington might get the quaint notion that fewer concerns would be able to take care of the needs of the public, and that therefore you may be one of those who will suffer as restrictions are applied.

All these thoughts should spur everyone in the food industry to constructive thinking about his own industrial existence for the next few years. If these words do not provide the necessary stimulus to think of your own industrial life, then events may catch up with you before you have made suitable plans.

No better stimulus to such constructive thinking could be imagined than a visit to the Chemical Industries Exposition, Grand Central Palace, New York, December 1 to 6. We recommend that as many as possible shall visit this exhibit of processing equipment and control apparatus. Forget that the show is called a "chemical show." Actually it is a processing-industry show.

When you go through (it will take at least a day, or two or three evenings) think of the following things:

1. Will some piece of equipment help me to produce foods needed for defense with less labor, less supervision or less chance for spoilage?
2. Will it permit me to change from a food potentially liable to restrictions to one that will fit into the wartime needs of the nation?
3. Will this or that material be a possible substitute for metals that require a high priority number to get any at all?
4. Could I possibly convert a vulnerable business into some sort of a defense food or a munitions industry that would enable me to keep my employees together and survive the defense effort?
5. What new equipment, processes or controls are available that will permit me to do a better or cheaper job on defense food production?
6. Who else in my organization should also visit this exposition?

In short, go to the Chemical Industries Exposition for help and inspiration in doing your part in defense.

Hors d'Oeuvres

• New definition for an optimist: One who is still uncertain about the future.

• *In England, to BEF or not to BEF, that was the question.*

• In Japan they make "butter" from vegetable and fish oils, even from smelly whale oil. Well, the Jipponese don't know on which side their bread is buttered anyway.

• *The unprecedented industrial output has so multiplied the demand for containers that wooden barrels are staging a comeback. Yes, we're rolling out the barrel, but no one expects to have fun.*

• The National Defense Nutrition Committee advised people to step up their vitamin intake. But instead of eating the proper diet, they rush to the drug stores to buy vitamin pills in unprecedented quantities. And so Homo sap continues to eat what he likes, when he likes, because he likes it, and to hell with eating according to Hoyle, or even Dr. Wilder.

• *National Peanut Week will be held the week of January 22. Well, a national nut week ought to pull a big following.*

• The sea horse is a fish with a head resembling that of a horse, an external skeleton similar to that of an insect, a prehensile tail like a monkey, and a kangaroo-like pouch for carrying the young. Nature must have had the DT's when she created that animal.

• *Two visiting American officials stopped for the night with two other men at the home of an Englishman who owned 17,000 acres of farm land. But two of the guests were sent to a neighbor's house because there was not enough extra food for four. When the English say they need food, they jolly well aren't fooling.*

• More than three billion live bees, packaged 5,000 to the pound in special "cages," were shipped north last spring from apiaries in the South. A honey of a beesness.

• *According to New York State Agricultural Experiment Station, if it crackles when you eat it, it's a huckleberry, not a blueberry. And so another great problem is solved.*

• In a feature article on wine, a New York evening paper made this comment: "Because chemists are involved does not mean there is anything artificial in the creation of these New York wines."—What did chemists ever do to deserve that reputation?

• *"Here's looking at you" originated with glass-bottom beer mugs in England many years ago. While doing bottoms-up drinkers would look at their companions through the bottom of the mug. But "here's looking up your old address" did not originate from a glass bottom.*

• Vitamin B_1 is necessary to the diet of a man of courage. So if you want to be a brave man B_1.

F. K. L.

Why Steel is Short

Speaking of the steel situation and its complete priority control, the following will not make you any happier, but it may serve to explain why restrictions are necessary. Warfare in the present day is conducted largely by machinery. And machines are mostly made of steel. OPM and the Army calculate that eight times as much steel is needed per man in the armed forces in 1941 as was needed in 1918.

Huge FSCC Purchases

Food for Britain is going overseas at a fairly steady rate. Figured in cases, the monthly shipments in 1942 will run between 10,000,000 and 15,000,000. A little over half of the expected amount will come from that part of the country east of the Rockies. All of this vast amount of food is purchased by FSCC, paid for by the government of the United States, and sent to Britian under the Lease-Lend arrangement.

Entrance to Grand Central Palace is on Lexington Ave. at 46th Street.

These Exhibits Will Help To Solve Your Problems

Much equipment and many materials suited to the special purposes of food processors will be seen at the 18th Exposition of Chemical Industries, Dec. 1-6, Grand Central Palace, New York. And in the following pages you get a quick preview of what is to be shown. This will save you time if you attend and keep you informed if you don't attend.

EVER since 1915 the biennial Chemical Show in New York City has been an outstanding exhibit of processing equipment and materials useful to food manufacturers as well as to the chemical processing industries. It has proved to be an unexcelled meeting place for those who use and those who sell these facilities.

War and defense requirements make the Chemical Show of greater importance this year than ever before. Faced with the necessity of rapidly expanding the production of processed foods to meet the requirements of Lend-Lease shipments as well as those of U. S. defense, but hedged in and restricted by priorities and shortages, most food processors have problems that these exhibits can help to solve. Customary ways of doing things are often prohibited by the impossibility of getting the necessary machines or metals. Pressure for increased production promotes the search for new or better methods and machines. Unfamiliar processes, such as dehydration, and unusual ways of packing food products must be adopted.

At the Chemical Show the answers to many of these pressing problems will be found in the exhibits themselves. These exhibits will cover the whole range of processing operations. Filters, centrifuges, dryers, screens, mixers, agitators, grinding equipment, heating equipment, tanks, material handling devices, are but a few of the things that will be shown by between three and four hundred exhibitors.

Not only will equipment for carrying out the unit operations of food manufacture be on exhibit, but also such indispensable accessories as control devices, piping, pumps, laboratory equipment, fabricating materials and containers will be displayed.

Also, the men who make these things will be there, to be consulted upon the proper use of their products, both those shown and others for which the available space

allows no room. Contact with these equipment experts cannot fail to turn up information useful in solving food processing difficulties.

● To help conserve the time of those who are fortunate enough to attend this year's Chemical Show, and also to inform those who cannot attend about the exhibits, the following pages contain a "preview" of the exhibits in print. Brief descriptions are given of those of the exhibits about which advance information was available. These are classified into groups such as evaporating, drying, controlling, materials of construction, etc., so that the reader can readily determine and locate the manufacturers who are showing things in which he is interested.

For those who are fortunate enough to be able to attend the 1941 Chemical Show, this preview should prove to be a time saver. By grouping the exhibits by operation, identifying each by number and name of company, it becomes possible to select quickly most of those exhibits of greatest importance, so that these can be visited first.

After such exhibits have been examined and discussed with the exhibitors, time should be allowed for browsing among the remaining displays. This will give an opportunity to pick up ideas and make contacts that may result in great, though unforeseen benefits.

For those who cannot be in New York during the Chemical Show, this preview will serve to bring some of the help that might follow upon attendance. The exhibits discussed in the preview have each been numbered. If you will turn to page 45 of this issue of Food Industries, you will find a mailing card upon which these numbers are reproduced. Just check the numbers of those exhibits about which you need more information, mail to Food Industries, and we will see that catalog data and other information are sent to you.

● Those who come to the Chemical Show should be sure to stop at Booth 42, where Food Industries will be glad to welcome them at its exhibit and extend such services as are within its powers. The show is easy to reach, the Grand Central Palace being at Lexington Avenue and 46th Street, just four blocks north of Grand Central Station. There is no admission charge—all you have to do to enter is to fill out a registration card showing your connection with the food or other processing industries.

CHEMICALS

1. Commercial Solvents Corporation, Terre Haute, Indiana—Chemicals including vitamin products and alcohols used in the food industry.

2. Glyco Products Co., Inc., Brooklyn, N. Y.—Information and displays of chemicals, including glyceryl laurate, glyceryl monostearate and monostearin that are used in the food industry. This exhibit will also include "Emulsone," a modified vegetable gum used for preparing stable emulsions and "Narobin," a vegetable product used with egg white.

3. Matheson Co., East Rutherford, N. J.—Compressed gases and their controls for research and industrial laboratories.

CONTROL EQUIPMENT

4. American Instrument Co., Silver Spring, Md.—Several new types of control and measuring instruments, including the new "Fermentometer" and manometric apparatus, will be on display. Other instruments include fused absorption cells, spectrophotometers and electric heaters and controls. All of these have a wide application in the food industry.

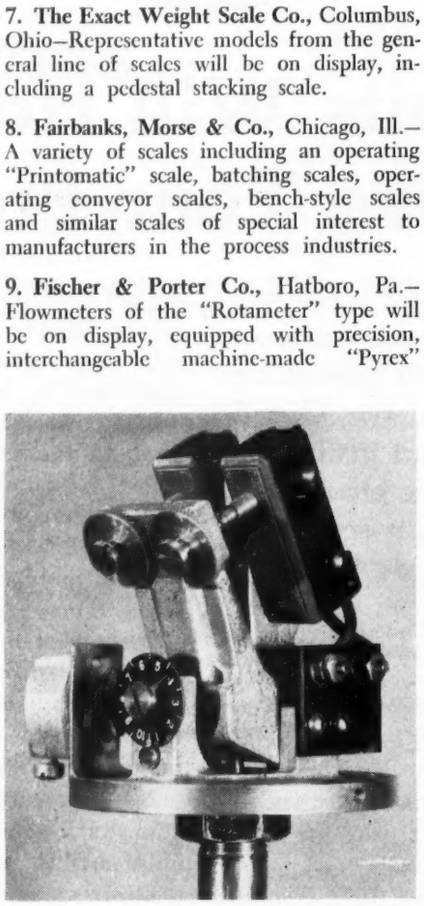
5. Burling Instrument Co., Newark, N. J.—Instruments for controlling temperatures from minus 100 or as high as 1400 deg. F. Based on the principle of differential expansion of solids, they find a wide range of uses, such as refrigeration, baking and annealing ovens, and furnaces.

6. Cambridge Instrument Co., Inc., New York, N. Y.—A new pH recorder which provides continuous, independent pH records on the same chart from two separate sampling points; also other types of pH meters and recorders; moisture indicators.

7. The Exact Weight Scale Co., Columbus, Ohio—Representative models from the general line of scales will be on display, including a pedestal stacking scale.

8. Fairbanks, Morse & Co., Chicago, Ill.—A variety of scales including an operating "Printomatic" scale, batching scales, operating conveyor scales, bench-style scales and similar scales of special interest to manufacturers in the process industries.

9. Fischer & Porter Co., Hatboro, Pa.—Flowmeters of the "Rotameter" type will be on display, equipped with precision, interchangeable machine-made "Pyrex" tubes. Other control applications using precision built tubes will be displayed.



Model VDII temperature control for heating or cooling or both. Adjustable temperature range for this instrument, 300 to 600 deg. F. This will be found in the Burling Instrument Co. booth.

10. Industrial Instruments, Inc., Jersey City, N. J.—A display of instruments used for controlling the quality of foods, including the "Solu-Bridge," an electronic instrument, which provide direct readings of certain factors such as the acidity or alkalinity of given liquids, the relative purity of water or the degree of rinse.

11. The Kron Co., Bridgeport, Conn.—Scales for every purpose. Information and actual display of scales will be found in this booth.

12. Sarco Co., Inc., New York, N. Y.—Temperature control instruments of the self-operated type for temperatures to 400 deg. F., with suitable valves for steam, water, brine or gas; also electric thermostats and solenoids. In addition, a line of mixing valves for hot and cold water to produce water of moderate constant temperature.

13. Schutte & Koerting Co., Philadelphia, Pa.—"Rotameter" flow measuring instruments and flow indicators with single or double sight glasses in several types.

14. Toledo Scale Co., Toledo, Ohio—The new "9300" Series "Printweigh" scale for direct printings of weights in full-size figures, operating in six-tenths of a second.

DISINTEGRATING

15. Abbé Engineering Co., New York, N. Y.—Ball and jar mills and rotary cutters.

17. C. O. Bartlett & Snow Co., Cleveland, Ohio—Processing equipment, including the triple action colloid mill. This machine is said to minimize aeration and foaming and to produce excellent disintegrations and dispersions of materials. The gap between

Bartlett-Snow triple action colloid mill showing the convenient location of the receiving funnel and discharge outlet and the integral mounting of the motor.

rotor and stator is adjustable to and calibrated in 1/1000 of an inch.

18. Combustion Engineering Co., Inc., Raymond Pulverizer Division, Chicago, Ill.—A number of pulverizing and grinding machines, including a working model of a bowl mill, a cagemill with flash dryer, full size model of a 12-in. screen mill, laboratory mill and a new 8-in. screen mill.

19. Pulverizing Machinery Co., Roselle Park, N. J.—Several of the line of "Mikro-Pulverizers," grinding equipment of the hammer mill type.

20. Robinson Manufacturing Co., Muncy, Pa.—The No. 9 saw crusher; the "Junior" single runner mill; the No. 3 standard motor-driven hammer mill, complete with fan; the No. 21 motor-driven "Unique" pulverizer; the No. 908 knife cutter, with transparent cover over one knife guard; the No. 1624 knife cutter, with metal cover over inlet; and the heavy-duty "rubber" grinder, 13 in., with water-cooled jacket, will be shown from this company's line of disintegrating equipment.

21. Sprout, Waldron & Co., Muncy, Pa.—Type SB rotary knife cutter, adapted for continuous alternating cutting and screening operations.

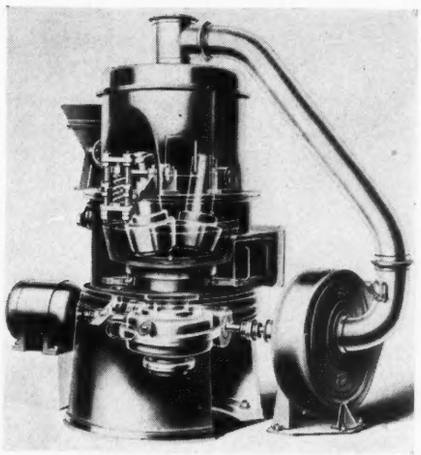
22. United States Stoneware Co., New York, N. Y.—"Roller-Type" grinding mills.

DRYING

23. L. O. Koven & Brother, Inc., Jersey City, N. J.—Informational exhibit on drying equipment.

24. Link-Belt Co., Chicago, Ill.—"Roto-Louvre" dryers.

25. Proctor & Schwartz, Inc., Philadelphia, Pa.—Full line of drying equipment for all sorts of foods and other products will be shown by photographs.



A Raymond bowl mill used for pulverizing coal. Very suitable for rotary kiln installations.

26. F. J. Stokes Machine Co., Philadelphia, Pa.—A new apparatus for drying products from the frozen state, also a small double drum dryer of atmospheric type, with variable speed, for experimental drying operations.

27. Vitreous Steel Products Co., Cleveland, Ohio—Blue and brown porcelain enameled drying trays for use in tray-type cabinet dryers.

EVAPORATING and DISTILLING

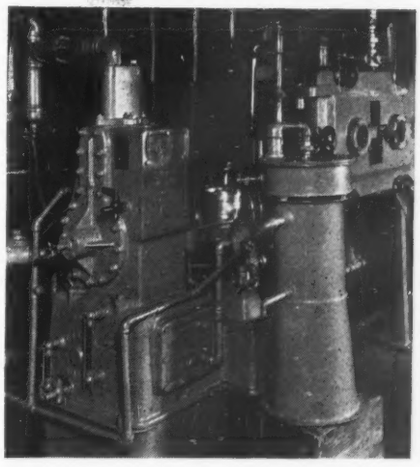
28. L. O. Koven & Brother, Inc., Jersey City, N. J.—Photo-montage displays on evaporation, distillation and extraction equipment.

29. Pfaudler Co., Rochester, N. Y.—A complete glass-lined distillation assembly, including jacketed glass-lined condenser, glass-lined receiver and glass-lined pipe and fittings.

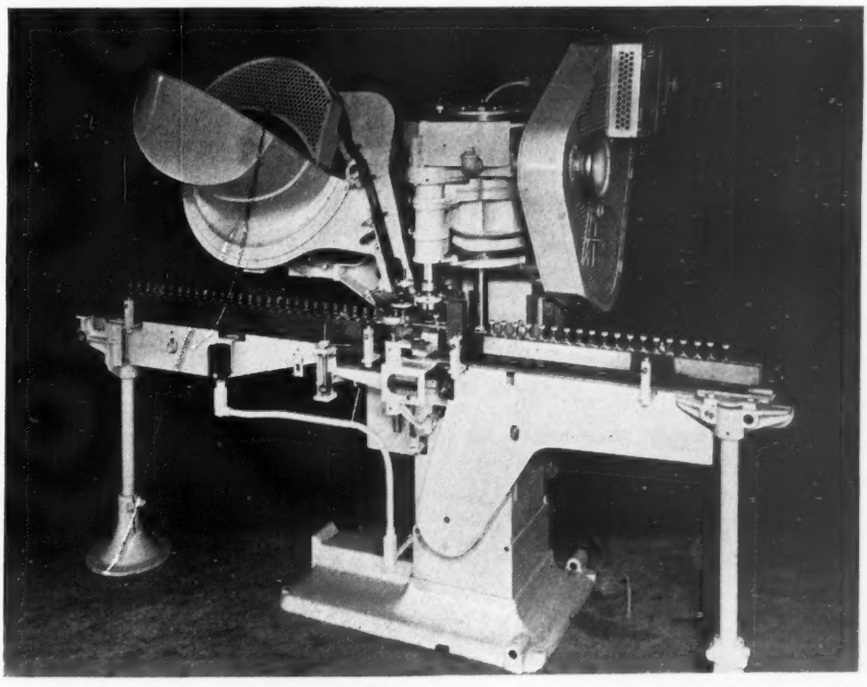
30. Zaremba Co., Buffalo, N. Y.—Photographs of industrial evaporating equipment used in making sugar, sirups, milk products, fruit juice products, corn products, gelatine and other food products.

FILLING

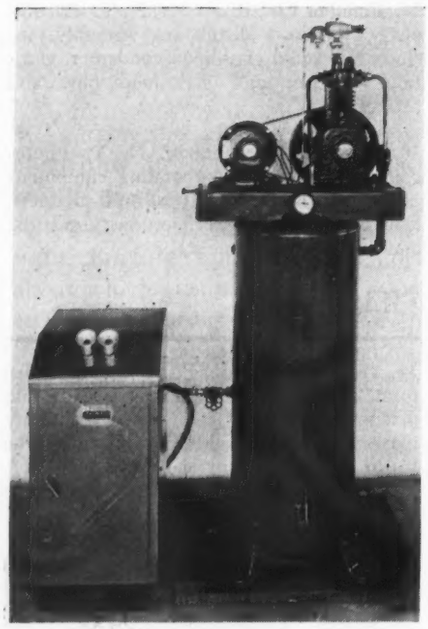
31. Horix Mfg. Co., Pittsburgh, Pa.—Information and display of automatic filling machinery including both automatic rotary machines and straight line filters. The featured machine will be Model HBW-18, 18-valve fully automatic rotary filler, capable of a speed of 125 pt. per minute.



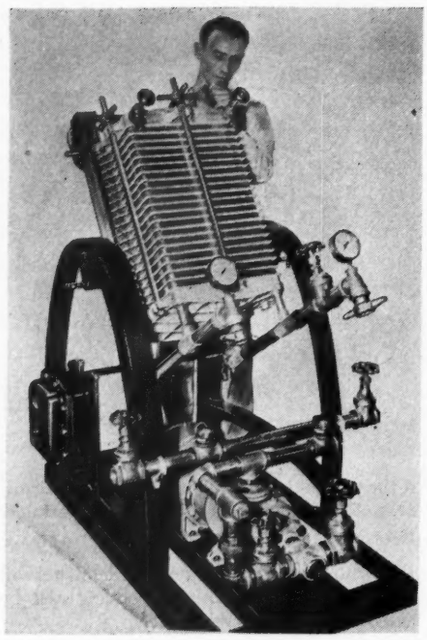
High vacuum pump, centrifugal clarifier and solvent vaporizer connected to apparatus used for drying from the frozen state, made by F. J. Stokes Machine Co.



Automatic single head capper for glass containers, made by Pneumatic Scale Corp., Ltd.



Semi-automatic inverted air cleaner for glass containers, made by Pneumatic Scale Corp., Ltd.



The Seitz Flexmaster is an entirely new type of filter, according to the American Seitz Filter Corp. It combines sheet and alluvial filtration, combines any kinds of media, in the only filter that turns from horizontal to vertical operating position.

machine is typical of all the filling equipment, which includes machines of all types (gravity, vacuum and gravity-vacuum) having speeds up to 400 containers per minute.

32. The Karl Kiefer Machine Co., Cincinnati, Ohio—Bottle, tube and can filling and sealing equipment, including the automatic rotary vacuum filling machine, the "Cinati Junior" vacuum filler and the "Duo-Blo" bottle cleaner.

33. Pneumatic Scale Corp., Ltd., No. Quincy, Mass.—Equipment used in the filling and closing of glass containers, including the semi-automatic "Inverted Air Cleaner" for blowing out containers before filling, the semi-automatic "Samco Jr." Filler, and the automatic "Single-Head" capper.

FILTERING

34. Alsop Engineering Co., Milldale, Conn.—Water filters, internal-pressure filters, high-pressure filters, asbestos disk filters, and filtering materials.

35. American Seitz Filter Corp., New York, N. Y.—Several types of filtering equipment and mediums, featuring the new Seitz "Flexmaster." It combines sheet and alluvial filtration, combines any kind of media, and can be turned from horizontal to vertical operating position.

36. Ertel Engineering Corp., New York, N. Y.—Several types of filter units and filtering equipment, including the Ertel hard rubber filter and infusion filter.

37. Filtration Engineers, Inc., New York, N. Y.—Filters and filtering equipment including a continuous rotary vacuum filter that includes many new features. Some of the features are the "FEinc" string discharge, wash and compression mechanism, and non-grinding automatic valve.

38. Selas Co., Philadelphia, Pa.—A full line of new American-made porcelain ignition-cleaning filter crucibles and candles with high flow rates, and controlled porosities.

39. T. Shriver & Co., Harrison, N. J.—A portable filter press, complete with pump, a Shriver diaphragm pump showing the operating mechanism, a motion picture showing the operation of filter presses in various industries.

40. Sparkler Manufacturing Co., Mundelein, Ill.—A group of industrial and water filters of laboratory and commercial sizes and constructed of various metals and alloys, featuring a filter with glass side walls in which the process of alluvial filtration can be observed.

41. D. R. Sperry & Co., Batavia, Ill.—Sample filter plates of various materials and photographs showing a new electric-hydraulic device for closing filter presses, also photographs of various types of filters.

FORMING

42. F. J. Stokes Machine Co., Philadelphia, Pa.—Materials compressed on Stokes tablet machines, including starch cubes, confections and concentrated food tablets.

GAS HANDLING

43. Beach-Russ Co., New York, N. Y.—High vacuum pumps, such as may be used on vacuum distillation, evaporation and drying.

44. Nash Engineering Co., South Norwalk, Conn.—"Clean-Air" compressor for furnishing air free from dust, heat or oil; and "Non-Pulsating" vacuum pumps for use with evaporators, condensers, deaerators, solvent recovery systems and similar applications.

45. New Jersey Machine Co., Hoboken, N. J.—The "Motoair," a vacuum or pressure pump, for vacuums up to 25 in. or pressures up to 30 lb., in capacities up to 35 cu.ft. per minute, with motor and pump constructed in one unit.

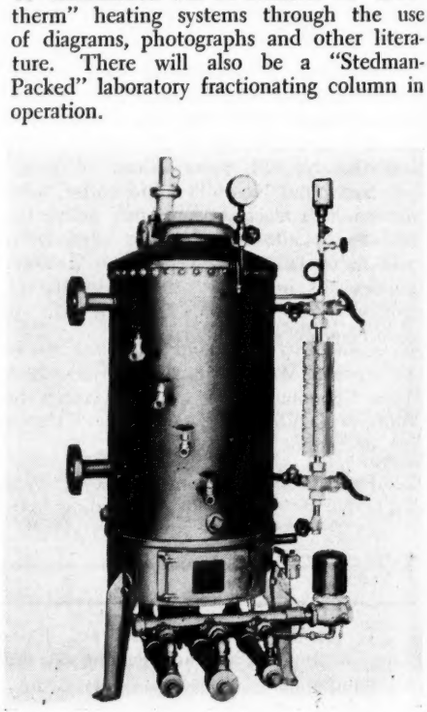
46. Schutte & Koerting Co., Philadelphia, Pa.—Steam jet vacuum pumps for use in various applications, including mash cooling, deodorizing, refrigerating, evaporating and condensing.

47. F. J. Stokes Machine Co., Philadelphia, Pa.—A Stokes high-vacuum pump, equipped with centrifugal and solvent vaporizer will be shown in operation connected with apparatus for drying from the frozen state.

HEATING EQUIPMENT

48. Eclipse Fuel Engineering Co., Rockford, Ill.—McKee "Dowtherm" vaporizers, having a rating of 210,000 B.t.u. per hour, will be displayed. This unit is used where indirect heating and temperatures of 350 to 600 deg. F. are required. It employs circulating a liquid (Dowtherm) around the material to be heated to give an indirect heat transfer that will not scorch or otherwise overheat the product being treated.

49. Foster-Wheeler Corp., New York, N. Y.—Information will be available on "Dowtherm" heating systems through the use of diagrams, photographs and other literature. There will also be a "Stedman-Packed" laboratory fractionating column in operation.



No. 6-D, 180,000 B.t.u. McKee gas-fired Dowtherm vapor boiler with off-on pressure controls.

50. **Lee Metal Products Co., Inc.,** Philipsburg, Pa.—Jacketed kettles, jacketed tanks and other processing equipment made of corrosion-resistant and stainless alloys, featuring a new Style C3T "Trunnion Type" jacket kettle with tilting agitator and bar type mixer, arranged for easy cleaning.

51. **Patterson-Kelly Co., Inc.,** East Stroudsburg, Pa.—Cookers, jacketed and coil type kettles, heat exchangers for food processing, of various alloys.

52. **Sarco Co., Inc.,** New York, N. Y.—Steam traps of four types: thermostatic vapor pressure, thermostatic liquid expansion, inverted bucket and float-thermostatic. Also a steam and water mixer to produce hot water at constant temperature.

LABORATORY EQUIPMENT

53. **Brabender Corp.,** Rochelle Park, N. J.—Several types of quality control instruments, including a semi-automatic moisture tester in which the moisture loss can be obtained directly from a scale graduated in percentage; a plastograph which records automatically the consistency and change in structure of a wide range of products; a viscograph that measures the viscosity of viscous substances from light viscous to fairly heavy, sirupy materials.

54. **Coleman Electric Co., Inc.,** Maywood, Ill.—pH meters, spectrophotometers, photofluorometers and other controlling and measuring devices.

55. **Fisher Scientific Co.,** Pittsburgh, Pa.—Instruments for controlling the quality of foods including refractometers, mobilometers, elecdropode and electrophotometer. The refractometers determine sugar content of canned foods, jellies and preserves; the "Garner" mobilometer determines the consistency of catsup, apple butter, creamed soups; the elecdropode determines small amounts of metals in foods; the electrophotometer is for determining vitamin C, fluorides, nitrogen and color of liquids.

56. **Hamilton Mfg. Co.,** Two Rivers, Wis.—Complete laboratory furniture for industrial use.

57. **Kewaunee Mfg. Co.,** Adrian, Mich.—Wood and metal laboratory furniture, work benches, fume hoods, storage cases and sinks.

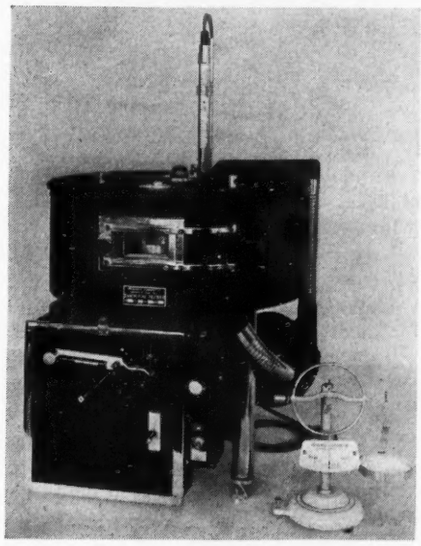
58. **King Refrigeration Co.,** Toledo, Ohio—All-purpose refrigerating cabinets equipped for controlling temperatures that range from —80 deg. F. upward.

59. **Photovolt Corp.,** New York, N. Y.—Vitamin determination and other laboratory equipment, including the "Lumetron" photoelectric colorimeter and fluorescence meter; the "Bills and Wallenmeyer" electronic photometer for vitamin A; the "Photrix" electronic timer; and the "Photrix" universal photometer.

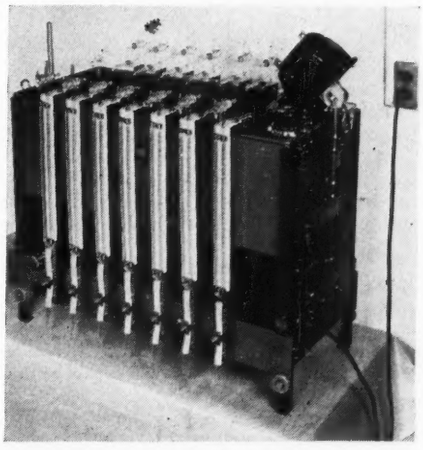
60. **Seederer-Kohlbusch,** Jersey City, N. J.—A line of precision balances and weights.

61. **W. A. Taylor & Co.,** Baltimore, Md.—A boiler water slide comparator for control of pH and phosphates in boiler water to prevent corrosion and scale formation.

62. **Edwin L. Wiegand Co.,** Pittsburgh, Pa.—Laboratory hot plates, Type ROPH, for heavy-duty laboratory heating operations, 120 and 240 volts, 660 to 2,000 watts capacity.



This is a semi-automatic moisture tester made by the Brabender Corp. Moisture loss can be read from a scale graduated in percentages.



Manometric apparatus for research work to be on display by American Instrument Co. measures the respiratory exchange in bacteria, yeast, cell cultures, spaces and plant and annual tissues.

LIQUID HANDLING

63. **Beach-Russ Co.,** New York, N. Y.—Rotary and centrifugal pumps.

64. **Crane Co.,** Chicago, Ill.—Information on piping for maintenance and operation of industrial piping systems.

65. **The Dorr Co., Inc.,** New York, N. Y.—A new "Dorrco" V-type pump, consisting of two chambers, V-type construction, with individual suction and discharge connections for each chamber.

66. **Downington Manufacturing Co.,** Downington, Pa.—A display of pumps designed to handle liquids or gases. The pumps consist of a flexible rubber tube which is alternately squeezed and released in a rocking, squeegee manner so that the liquid or gas is actually breathed into and out of the tube. The liquid or gas being pumped is totally inclosed within the tube, from the time it enters the pump until it leaves, thus it cannot come in contact with any metal parts of the pump. The tube itself can be made of pure gum rubber and various acid and oil-resistant synthetic materials; in addition, rubber tubes can be lined with synthetic materials for corrosion resistance or to prevent contamination.

67. **Eastern Engineering Co.,** New Haven, Conn.—Midget pumps driven by either air or electric motors.

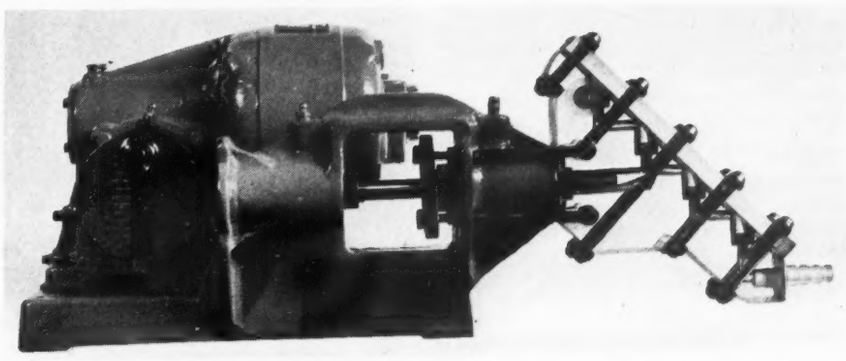
68. **Grinnell Co.,** Providence, R. I.—Pipe fittings, adjustable pipe hangers and welding fittings.

69. **Kinney Mfg. Co.,** Boston, Mass.—Various types of pumps including the compound vacuum pump, the VSD single-stage vacuum pump, rotating plunger pump and a vacuum-tight valve pump for handling liquids.

70. **Lapp Insulator Co., Inc.,** Le Roy, N. Y.—Chemical porcelain, featuring porcelain valves, pipe and fittings for resistance to acids and other corrosive liquids.

71. **Link-Belt Co.,** Chicago, Ill.—Spray nozzles.

72. **Monarch Manufacturing Works, Inc.,** Philadelphia, Pa.—Water sprays and corro-



Plastic pump of Step-Valve construction, made by Milton Roy Pumps.

sion-resistant spray nozzles, including new stainless steel spray nozzle for powdered milk plants, made of stainless steel and a special long-life material at orifice.

73. Nash Engineering Co., South Norwalk, Conn.—Centrifugal pumps of "Pyrex" glass for the sanitary handling of all sorts of food liquids, shown in operation.

74. Packless Metal Products Corp., New Rochelle, N. Y.—Flexible metal hose, couplings and "Self-Flaring" fittings, for use with such equipment as cocoa presses and bottling machinery.

75. Wm. Powell Co., Cincinnati, Ohio—A complete line of valves for process industries work, including bronze, iron, steel and corrosion-resistant alloy valves. Also liquid level gages and various accessories equipment.

76. Milton Roy Pumps, Philadelphia, Pa.—Sanitary easy cleaning pumps for viscous liquids, other food liquids and for cleaning solutions, of "Step-Valve" construction, including standard fractional horsepower units, a standard micro-adjustment unit, and a transparent plastic unit.

77. Claude B. Schneible Co., Chicago, Ill.—The "Wearproof" pump for pumping sludge and water.

78. Schutte & Koerting Co., Philadelphia, Pa.—Spray nozzles to produce conical or flat sprays, varying from finest atomization to coarse drops.

MATERIALS OF CONSTRUCTION

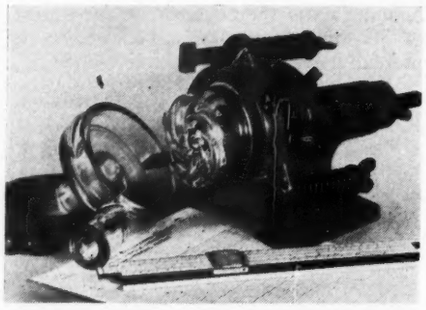
79. Allegheny Ludlum Steel Corp., Brackenridge, Pa.—On display at this booth will be materials used in the transportation of various kinds of products. "Pluramelt" will be featured as a new material. The "Pluramelt" technic is a new and revolutionary method of furnace melting in which steel embodying more than one composition is produced.

80. American Hard Rubber Co., New York, N. Y.—Hard rubber and rubber-lined pipe, rubber-lined tanks and valves, and hard rubber filter press plates.

81. Ansul Chemical Co., Electro Chemical Supply and Engineering Co. Division, Paoli, Pa.—New products, including "Syntho" and "Brimsto," used in the construction of linings for tanks and other equipment subject to corrosion from chemicals. "Duro" and proof brick and cement will be included for construction of floors, drains, equipment linings and other uses in the food and chemical industry.

82. Edward G. Budd Manufacturing Co., Philadelphia, Pa.—Metal handling tables, seamless buckets and pans, vegetable preparing trays and hand trucks for handling foods.

83. Carpenter Steel Co., Welded Alloy Tube Division, Kenilworth, N. J.—Seamless tubing, including a welded inside polished tubing, which can be used in the dairy and fruit packing industries.



Laboratory or pilot plant centrifugal pump of Pyrex glass for handling food liquids, made by Nash Engineering Co.

84. Corning Glass Works, Corning, N. Y.—Corrosion-resistant, heat-resistant equipment for modern food plants. This equipment will include a glass centrifugal pump, a large heat exchanger, and a newly introduced "Vycor" brand glassware.

85. General Alloys Co., Boston, Mass.—Information and displays of corrosion-resistant castings used by the food industries.

86. Haveg Corporation, Newark, Del.—Tanks, piping, fittings, trays, filters and other equipment for handling food and chemical products.

87. Maurice A. Knight, Akron, Ohio—This exhibit will include samples of ceramic and other materials for tank linings, pipe and equipment for resisting acid.

88. Luzerne Rubber Co., Trenton, N. J.—Corrosion-resistant hard rubber for the fabrication of equipment and accessories for handling corrosive solutions.

89. Lebanon Steel Foundry, Lebanon, Pa.—Stainless and corrosion-resistant alloy steel castings for processing equipment.

90. Quigley Co., Inc., New York, N. Y.—Refractory and insulating materials, protective coatings, acid-proof cements, joint sealing compounds and cleaning compounds.

91. Republic Steel Corp., Cleveland, Ohio—Featuring a ten-minute color film on "Enduro" stainless steel; this exhibit will also show applications of stainless steel and tubing.

New "9300" Series "Printweigh" scale made by Toledo Scale Co.

92. Synthane Corp., Oaks, Pa.—New applications of technical plastics in parts resistant to corrosion from acids, alkalis, salts, oils, solvents and water.

93. United States Stoneware Co., New York, N. Y.—Corrosion, acid and alkali resistant materials, including coatings, cements, putties, tank linings, brick and tile and chemical stoneware.

94. United States Steel Corp., and Subsidiaries, Chicago, Ill.—Diversified display of steels and steel products suitable for the process industries, featuring a 3-minute animated playlet dealing with stainless steel.

MATERIALS HANDLING

95. A-1 Bottling Machinery Co., Dover, N. J.—Hook link chains and conveyors.

96. Barrett-Cravens Co., Chicago, Ill.—Lift-trucks, portable elevator and a "Rockerack" will be on display. The "Rockerack" is a drain rack for tilting or raising drums. Lift trucks are operated by hand, while the portable elevator is electrically operated.

97. C. O. Bartlett & Snow Co., Cleveland, Ohio—Elevating and conveying equipment.

98. Falstrom Co., Passaic, N. J.—Barrel lift for easily and safely raising, moving and tilting loaded barrels and drums.

99. Iron-Bound Box & Lumber Co., Inc., Hillside, N. J.—Skid platforms for handling heavy loads up to and including 10,000 pounds.

100. The Jeffrey Mfg. Co., Columbus, Ohio—The equipment exhibited will consist of vibrating feeders and conveyors and other pieces of equipment for handling materials.

101. Lamson Co., Syracuse, N. Y.—Exhibits of samples and photographs of various types of materials handling equipment, featuring a full size "Utility" conveyor, a portable inclined device for stacking or unstacking, or otherwise handling boxes and cartons.

102. Lewis-Shepard Sales Corp., Watertown, Mass.—Lift, floor and hand trucks, skid platforms, stacking portable elevators, portable cranes and storage racks are among the materials handling devices shown.

103. Link-Belt Co., Chicago, Ill.—"Bulk-Flo" power-operated elevator conveyor for continuous conveying of flowable granular, crushed, ground or pulverized materials. Also included in this exhibit will be pictures of other conveyors, drives and similar equipment.

104. Rapids-Standard Co., Grand Rapids, Mich.—A "Rapid Powder-Booster" in operation in conjunction with a "Rapid-Wheel" conveyor, handling boxes. Also ABK resinoid wheels, a new floor-protective wheel for factory trucks.

105. **Robinson Manufacturing Co.,** Muncy, Pa.—A vertical screw elevator, with horizontal feed screw and "Lucite" inspection window; and an inclined screw elevator for conveying from sifter to mixer.

106. **Stephens-Adamson Mfg. Co.,** Aurora, Ill.—A complete "Redler" conveyor handling system, including a horizontal closed circuit unit, an L-type unit, and a "Loop Boot" elevator.

107. **Syntron Co.,** Homer City, Pa.—Several models of vibrators for use in causing material to flow from hoppers or along chutes. Also vibratory and "Gravimetric" feeder conveyors for controlled, continuous flow of dry, granular materials.

MISCELLANEOUS

108. **Barco Manufacturing Co.,** Chicago, Ill.—This display will include the Barco ball, revolving and swivel joints.

109. **Edward G. Budd Mfg. Co.,** Philadelphia, Pa.—Stainless steel equipment fabricated on order.

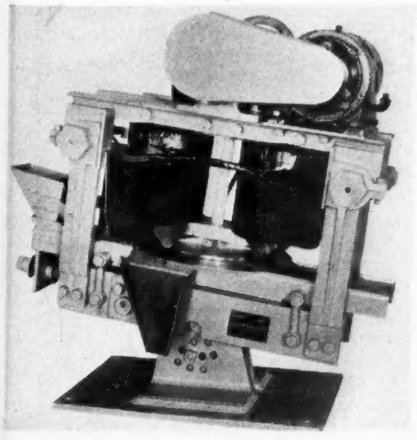
110. **Hanovia Chemical & Mfg. Co.,** Newark, N. J.—Irradiating equipment of the quartz tube mercury arc type, the thermionic type, and various designs used in the laboratory and industrial processes. Included will be an ultraviolet water sterilizer which kills all bacteria in water.

111. **L. O. Koven & Brother, Inc.,** Jersey City, N. J.—Tanks, kettles, piping and other equipment for special handling of products.

112. **Martindale Electric Co.,** Cleveland, Ohio—Protective face mask to be worn by workers exposed to irritating or poisonous dust hazards.

113. **Patterson-Kelly Co.,** East Stroudsburg, Pa.—Storage tanks of various metals and alloys for storing food materials.

114. **Pfaudler Co.,** Rochester, N. Y.—Standard glass-lined reaction equipment, featuring a 500-gal., all-welded one-piece, glass-lined high-pressure reactor with glass-coated agitator and baffle, for pressures up to 150 pounds.



New Type VT magnetic separator made by Magnetic Engineering & Mfg. Co., in which magnetic material is removed by a disk revolving above a vibrating tray.

115. **York Ice Machinery Corp.,** York, Pa.—Model DER 10, "Flak Ice" machine for making ice in ribbon form, used in packing food products for shipment or delivery.

MIXING

116. **Abbé Engineering Co.,** New York, N. Y.—The "Lenart" mixer for mixing sirups, jellies, chocolate products, pectin and other food materials.

117. **Alsop Engineering Corp.,** Milldale, Conn.—Portable electric mixers; mixing, storage and settling tanks; production-size mixing machines.

118. **The Dorr Co., Inc.,** New York, N. Y.—Working models of the Dorr agitator, turbo-mixer, "Dorrco" flocculator, "Clariflocculator" and "Hydro-treator."

119. **Eastern Engineering Co.,** New Haven, Conn.—Mixing equipment run with both air and electric motors. Size ranges from laboratory to production requirements.

Model DER-10 "FlakIce" machine for making ice ribbons, made by York Ice Machinery Corp.

120. **Hendrick Manufacturing Co.,** New York, N. Y.—Mixing equipment for gas-liquid, liquid-liquid, solid-liquid and solid-solid mixing. A continuous type mixer employing an injection agitator unit and a batch type mixer equipped with a super-turbine agitator will be in operation.

121. **L. O. Koven & Brother, Inc.,** Jersey City, N. J.—Informational exhibit on the company's mixing equipment.

122. **Eppenbach, Inc.,** Long Island City, N. Y.—Colloid mills and homogenizers for food products will be on display. The "Homo-Mixer" will be featured for mixing food products without the incorporation of air.

123. **National Engineering Co.,** Chicago, Ill.—The "Simpson" mixer, a machine with stainless steel pan for mixing all sorts of materials, arranged for mixing under vacuum or pressure, and equipped with heating elements for mixing at controlled temperatures.

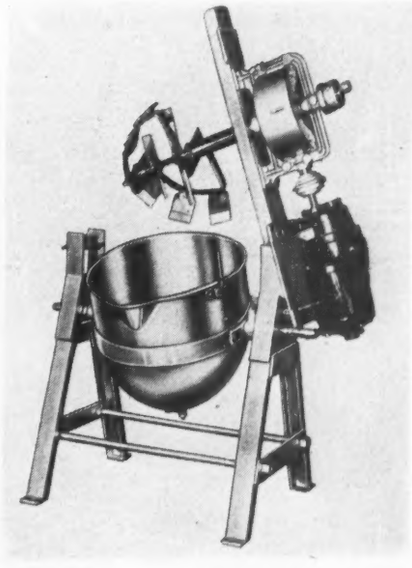
Face mask to protect workers from dust hazards, made by Martindale Electric Co.

124. **Patterson-Kelly Co., Inc.,** East Stroudsburg, Pa.—Plain and jacketed mixers of anchor, propeller and turbine wheel types.

125. **Premier Mill Corp.,** Geneva, N. Y.—Premier mills and mixers will be shown, including a small laboratory mill directly mounted on a universal high-speed motor, a laboratory model mixer and a plant production unit of the new "Premier" mixer.

126. **Read Machinery Co., Inc.,** York, Pa.—A mixer and blender, a small laboratory mixer, and new streamlined vertical planetary action mixers. Also a large animated flow chart showing flow of material through a typical plant from dump bin to mixer.

127. **Robinson Manufacturing Co.,** Muncy, Pa.—A special "Unique" mixer, 24 in. x 4 ft. 6 in., horizontal type with slotted ends, removable element for cleaning, full jacket for heating, and plug discharge.



Style C3T Trunnion Type jacket kettle with tilting agitator, made by Lee Metal Products Co., Inc.

128. Sprout, Waldron & Co., Muncy, Pa. —A standard Type B horizontal mixer and blender with full or half jacket for heating or cooling of dry free-flowing food materials.

129. United States Stoneware Co., New York, N. Y.—The "Cyclonaire" mixer, a chemical stoneware mixer with propeller-type agitator motor-driven from self-mounted motor on side.

PACKAGING

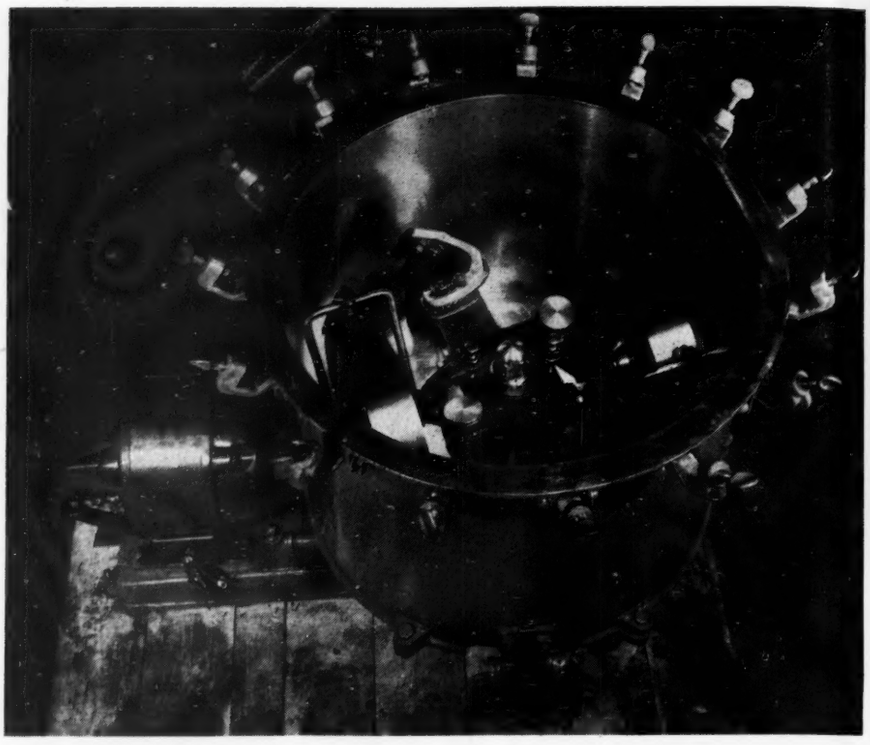
130. Acme Steel Co., Chicago, Ill.—A complete line of straight arm, bottom and combination carton stitching machines will be in operation. Included is a special single-pedal control which is adjustable and reduces by 50 percent manual effort required for stitching.

131. The Associated Cooperage Industries of America, Inc., St. Louis, Mo.—A complete line of cooperage will be displayed—tight barrels and kegs for liquids; slack barrels and kegs for semi-dry and powdered products; beer kegs for beer.

132. The Container Co., Van Wert, Ohio —A display of containers including the "Stapak," "Fiberpak" and "Leverpak" shipping drums.

133. Economic Machinery Co., Worcester, Mass.—Labelers will be on display, including the "World" automatic "Uni-Turret" and Model CH semi-automatic labeler. The "Uni-Turret" labeler will be on display for the first time and labels round-shaped bottles, smooth, fluted or fancy, and may be fed from any one of three directions—right or left side, parallel to the front of the labeler or perpendicular to it. The semi-automatic labeler applies single labels from postage stamp size to a very large size and will apply them to different size or shape bottles from tiny vials up to 4 in. in diameter.

134. Elgin Manufacturing Co., Elgin, Ill.—Different types of machinery for the packaging industry will be on display, including a straight-line capping machine that is automatic in action and feed, featuring safety devices reducing breakage losses.

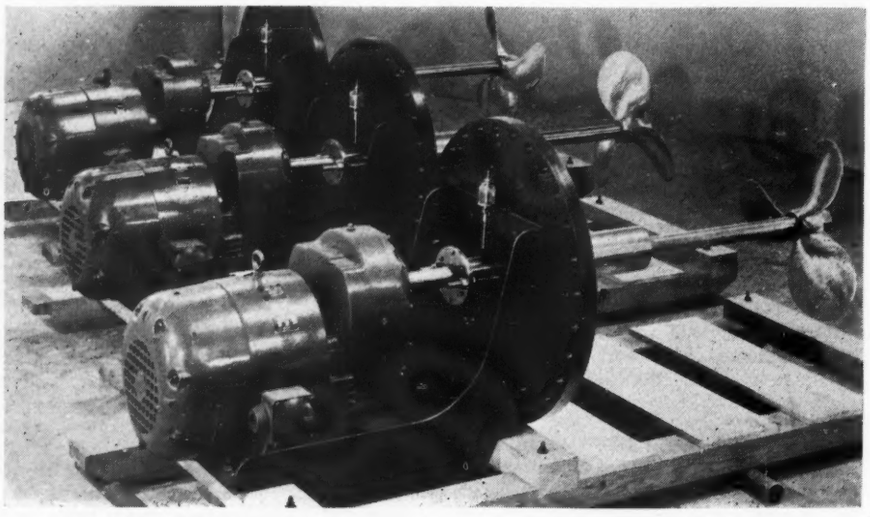


Simpson mixer of laboratory size, made by National Engineering Co. Cover removed to show mixing elements.

135. Edward Ermold Co., New York, N. Y. —Several types of hand labelers will be on display, including both belt- and motor-driven machines.

136. Fulton Bag and Cotton Mills, Atlanta, Ga.—Waterproof paper-lined burlap and cotton bags.

137. B. F. Gump Co., Chicago, Ill.—This company will exhibit several types of packaging equipment, including the "Vibrox" barrel packer, "Bar-Nun Auto-Check" net weigher, "Drawer" volume percentage feeder, "Bar-Nun" rotary sifter and the "Bar-Nun" bag packing equipment.



A battery of 25-hp. explosion-proof side-entering agitators complete with companion, ready for bolting to tanks. Made by the Alsop Engineering Corp.

138. Keystone Drum Co., Pittsburgh, Pa.—Drums made with steel heads spun integrally onto a laminated fibre shell, assuring liquid-tight chimes, will be on display.

139. National Box & Lumber Co., Newark, N. J.—The "Hercules" carboy box, a box specially designed for protecting carboys during shipment and handling.

140. New Jersey Machine Co., Hoboken, N. J.—The "Pony Labelrite," a two-at-a-time machine for applying labels to ordinary glass containers at a rate of 120 per minute; the fully automatic "Labelrite," a machine for applying labels to large glass containers at a rate of 70 per minute; and the "Pacemaker," a table type label gummer for supplying hand labeling operators.

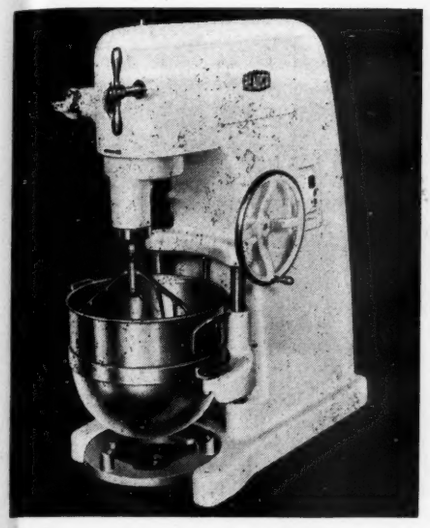
141. Pressed Steel Tank Co., Milwaukee, Wis.—Metal containers, including "Hackney" steel cylinders and full removable head barrels and drums.

142. Stokes & Smith Co., Philadelphia, Pa.—A "Transwrap" automatic packaging machine for making, filling and sealing transparent packages of all sorts of dry products, also samples of other containers and packages handled by other packaging machines made by this company.

143. Syntron Co., Homer City, Pa.—Jolters, joggers and vibrators for use in filling dry materials into packages.

144. Aurelio Tanzi Engineering Co., Brooklyn, N. Y.—An automatic packaging machine, the "Acma 720," for high-speed wrapping of small packets or packages of candy, chocolate, powders and similar products.

145. Triangle Package Machinery Co., Chi-



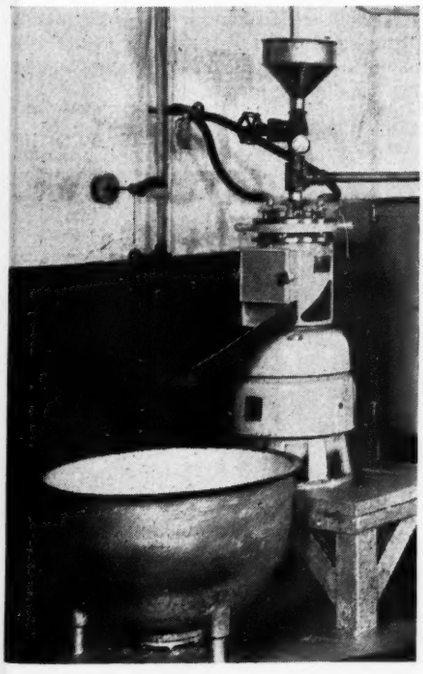
New type of streamlined vertical planetary action mixer made by Read Machinery Co.

cago, Ill.—Volumetric package filling machinery for filling dry materials into packages accurately by volume, and a vibratory feed weigher packaging machine for filling dry materials accurately into packages by weight.

146. **Edwin L. Wiegand Co.,** Pittsburgh, Pa.—Type HP package sealing hot plates for heat sealing wrapping materials, in 600 and 800-watt capacities.

POWER APPLICATION

147. **Philadelphia Gear Works,** Philadelphia, Pa.—A complete line of speed reducers and allied equipment for industrial power drives.



Premier mill installed in mayonnaise and salad dressing production line made by Premier Mill Corp.

148. **Reeves Pulley Co.,** Columbus, Ind.—Various sizes, designs and controls of Reeves variable speed control units, consisting of variable speed transmission, variable speed motor pulley and "Vari-Speed Motodrive," providing variable speed adjustability for all kinds of processing equipment.

149. **Stephens-Adamson Mfg. Co.,** Aurora, Ill.—"Sealmaster" ball-bearing pillow blocks and flange units in operation on both low- and high-speed shafts.

150. **Westinghouse Electric & Manufacturing Co.,** East Pittsburgh, Pa.—Totally inclosed fan cooled motors for use in hazardous atmospheres where dust particles might cause damage to an open motor.

151. **Eastern Engineering Co.,** New Haven, Conn.—Several types of air and electric motors for mixing equipment.

152. **The Louis Allis Co.,** Milwaukee, Wis.—A complete line of electric motors showing the size and type for different industrial requirements, and featuring the "Ajusto-Spede" unit.

153. **General Electric Co.,** Schenectady, N. Y.—This exhibit will furnish information on electrical appliances; displays including the "Tri-Clad" motors, the new EJ-2 current-limiting fuses and "Magna-Blast" breakers.

SEPARATING

154. **Abbé Engineering Co.,** New York, N. Y.—The "Blutergess" sifter finds a wide range of applications on sugar, flours, baking powder and similar products.

155. **The American Foundry Equipment Co.,** Mishawaka, Indiana—Working models of two pieces of equipment, the American "Dustube" dust collector and the American "High Efficiency Cyclone" dust collector. These are employed to recover such products as chocolate, cocoa, soybeans, starch, sugar, tea and salt.

156. **American Machine and Metals, Inc.,** Tolhurst Centrifugal Division, East Moline, Ill.—Extractors on display will include suspended, center slung, solid curb and laboratory units.

157. **Bird Machine Co.,** South Walpole, Mass.—A line of centrifugal separating equipment including the Bird continuous centrifugals. These machines are built in five sizes to meet individual problems.

158. **Fred S. Carver,** New York, N. Y.—Carver laboratory presses, having wide applications in food research laboratories.

159. **Combustion Engineering Co., Inc.,** Raymond Pulverizer Division, Chicago, Ill.—Working model of a mechanical air separator and a full-size laboratory separator.

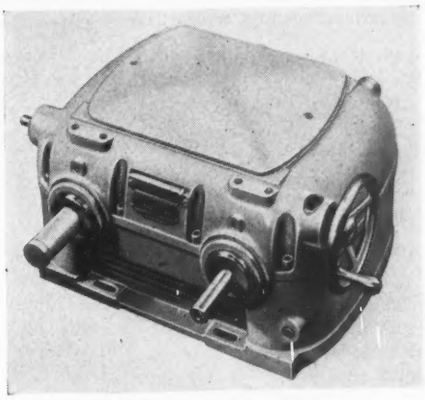
160. **Denver Equipment Co.,** Denver, Colo.—A two-deck model of the "Denver-Dillon" vibrating screen will be in operation; also a Denver "Hydro-Classifier." A display case will show wheat beneficiated with Denver "Sub-A" flotation cells and how this wheat is used in making staff bread. A laboratory flotation machine will be in operation, which is used in the cleaning of wheat.

161. **The Dorr Co., Inc.,** New York, N. Y.—Working models of various types of classifiers and thickeners.

162. **Fletcher Works, Inc.,** Philadelphia, Pa.—Centrifugals will be exhibited including under-driven "Whirlwind" and motor-driven suspended centrifugals. Features of some of the equipment will include a fume hood and liquid seal; also explosion-proof motor and controls.

163. **S. G. Frantz Co., Inc.,** New York, N. Y.—Electrically energized "Ferro Filters," for removing magnetic materials, will be on exhibit. This will include the pipe line, gravity and underfeed types for liquids and also for dry materials. Permanent magnet "Ferro Filters" will also be displayed.

164. **Graver Tank & Mfg. Co., Inc.,** East



The Vari-Pitch Speed-Changer, made by Allis-Chalmers.

The straight arm Silverstitcher made by the Acme Steel Co., is designed for stitching sides and ends of telescope and folding cartons, beverage cases, display units and set-up boxes.

Chicago, Ind.—Line drawings of a classifier and reactivator used in the field of water conditioning, also other water treating installations.

165. Link-Belt Co., Chicago, Ill.—A "Liquid Vibrating Screen" for reclaiming or screening out solids from factory waste water will be in operation.

166. Magnetic Engineering & Mfg. Co., Clifton, N. J.—Equipment for separating iron particles and pieces from non-magnetic materials; Type VT, a vibrating separator in which magnetic material is removed from above by a rotating disk. Also a complete magnetic pulley separator.

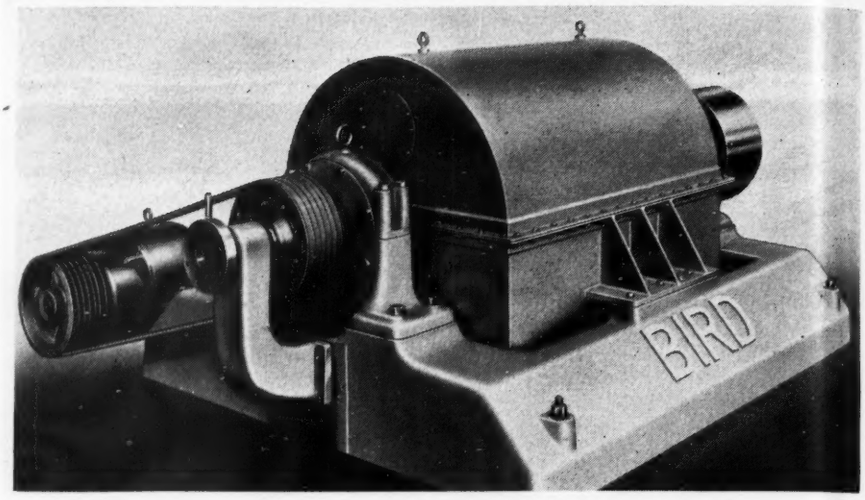
167. Newark Wire Cloth Co., Newark, N. J.—Samples of a complete line of wire cloth for screening and sieving. Also the "End-Shak," a machine for shaking from 1 to 3 testing sieves of 8-in. diameter.

168. Productive Equipment Corp., Chicago, Ill.—A full-size unit of the "Selectro" line of vibrating screens and small models of other screening units.

169. Robinson Manufacturing Co., Muncy, Pa.—The No. 13 "Unique Gyro" sifter, a vibratory screening device.

170. Claude B. Schneible Co., Chicago, Ill.—A miniature Schneible "Multi-Wash" dust and fume collector, made largely of glass to show the operation.

171. Separations Engineering Corp., New York—Sutton, Steele & Steele, Inc., Dallas, Tex.—A Sutton, Steele & Steele "Air Table" for separating foreign matter from such food materials as grains, beans, peanuts, peas and seeds, also for removing shriveled, broken or defective units from the mass; an "Electrofloat Separator" for removing dirt from seed grains and similar food materials.



The Bird Continuous Centrifugal Filter handles thick or thin, hot or dry slurries. Solids may be coarse or fine, crystal line or amorphous.

172. Sharples Corp., Philadelphia, Pa.—Exhibit of photographs and cross-sectional cuts of various types of centrifuges, featuring the new "No-Foam Super-Centrifuge," in which liquids can be clarified out of contact with air.

173. T. Shriver & Co., Harrison, N. J.—A small operating unit of the new Shriver thickener, for thickening, washing and leaching various products.

174. W. S. Tyler Co., Cleveland, Ohio—Woven wire screens and screening equipment, including the "Ro-Tap" testing sieve shaker; and the "Junior" Type 28 "Hummer" electric vibrating screen.

RECEIVED TOO LATE TO CLASSIFY

175. Products Corporation, Rochester, N. Y.—Informational exhibit explaining the dry separation of granular substances by means of the Johnson electrostatic process. This process is being used for the concentration of minerals in food products such as spices, feed, coffee and cocoa beans.

176. W. A. Hammond Drierite Co., Yellow Springs, Ohio—Exhibit pertaining to industrial drying, including an assortment of Drierite products and other special products recently developed.

177. National Carbon Co., Inc., Cleveland, Ohio—Model of an electrostatic precipitator, heat exchangers, tank linings, filters and diffusers, electrical equipment, pipe, fittings and a number of other items. Also included will be the new "Karbate" pump for handling corrosive liquids.

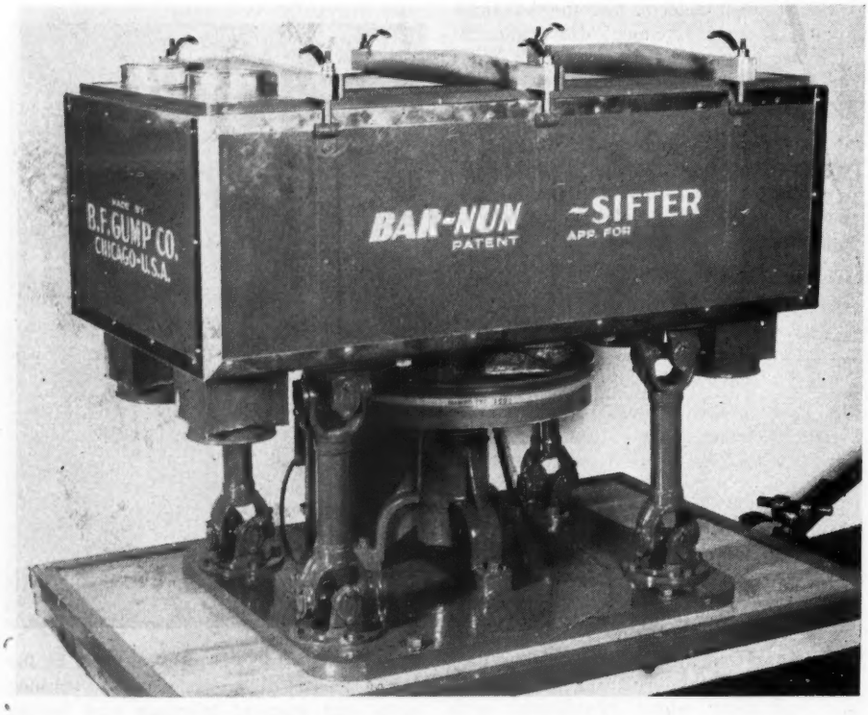
178. Walworth Co., Inc., New York, N. Y.—Valves, fittings, pipe and pipe wrenches.

179. Casein Co. of America, Division of the Borden Co., New York, N. Y.—Glues, cements and casein. New products will include casein (wool) fiber, "transparent" casein, resin emulsions and new flexible casein.

180. Darco Corp., New York, N. Y.—Activated carbons for decolorizing, refining and purifying liquids and solutions.

181. The Carborundum Co., Niagara Falls, N. Y.—Display of heavy refractories used where very high temperatures and relatively severe physical and chemical conditions are encountered. Operating furnaces equipped with Globar heating elements. A complete line of refractory laboratory ware. Porous filters and diffuser mediums.

182. Williams Patent Crusher & Pulverizer Co., St. Louis, Mo.—Reducation machinery and air separation machinery. Machines on display will be the Williams improved roller mill with air separator, a Helix-Seal



The Bar-Nun sifter, made by the B. F. Gump Co., handles such materials in powder form as baking powder, casein, dried milk and gelatine.

fine grinding hammermill and a Williams 2½-ft. mechanical air separator.

183. **American Resinous Products Corp.,** Peabody, Mass.—Exhibits of resins, waxes and lacquers dispersed in water. Information on typical materials, products and goods made or processed using these aqueous dispersions and emulsions.

184. **Charles Engelhard, Inc.,** Newark, N. J. —Controlling and measuring instruments including various kinds of recording pyrometers, gas analyzers and resistance thermometers.

185. **Mixing Equipment Co., Inc.,** Rochester, N. Y.—Photographic display showing the applications of mixing equipment. This display will also include a new line of mixers driven by air motors.

186. **Tri-Clover Machine Co.,** Kenosha, Wis.—Non-agitating screw type impeller pumps, tubing, pipe valves, pressure fittings, and in-the-line filters and other specialties.

187. **Kimble Glass Co.,** Vineland, N. J.— Glass apparatus for biological, chemical and metallurgical laboratories. Also small glass containers.

188. **New England Tank & Power Co.,** Everett, Mass.—Display will include a newly developed mixer designed for continuous mixing, also standard Nettco agitator drives, totally inclosed and open geared models.

189. **J. M. Lehman Co., Inc.,** New York, N. Y.—Photographs and actual display of standard roller mills for grinding and dispersing of inks, paints and kindred materials.

190. **Laboratory Furniture Co., Inc.,** Long Island City, N. Y.—Laboratory furniture and equipment.

191. **Bakelite Corporation,** New York, N. Y.—This display will show the interesting developments in plastics and will demonstrate the unique properties of certain new materials.

192. **American Meter Co., Inc.,** New York, N. Y.—Orifice meters, gas displacement meters and regulators, together with laboratory equipment such as wet and dry test meters.

193. **Bemis Bro. Bags Co.,** St. Louis, Mo.— Exhibit showing the various services offered to users of burlap, cotton and paper bags.

194. **Chemicolloid Laboratories,** New York, N. Y.—Newly designed sanitary model Charlotte colloid mill.

195. **The Marlo Co.,** New York, N. Y.— Mechanical packings including the Pure Tin packing which is of interest to the manufacturers of food.

196. **Ingersol Steel & Disc Division, Borg-Warner Corp.,** Chicago, Ill.—Jacketed kettles.

197. **Lancaster Iron Works, Inc.,** Lancaster, Pa.—Display will include a demonstration laboratory unit of the "Lancaster" mixer and scale models of the larger capacity machines.

198. **St. Regis Paper Co.,** New York, N. Y. —Informational and photographic display covering special high speed filling equipment; also information on multi-wall paper bags covering a wide range of industrial uses.

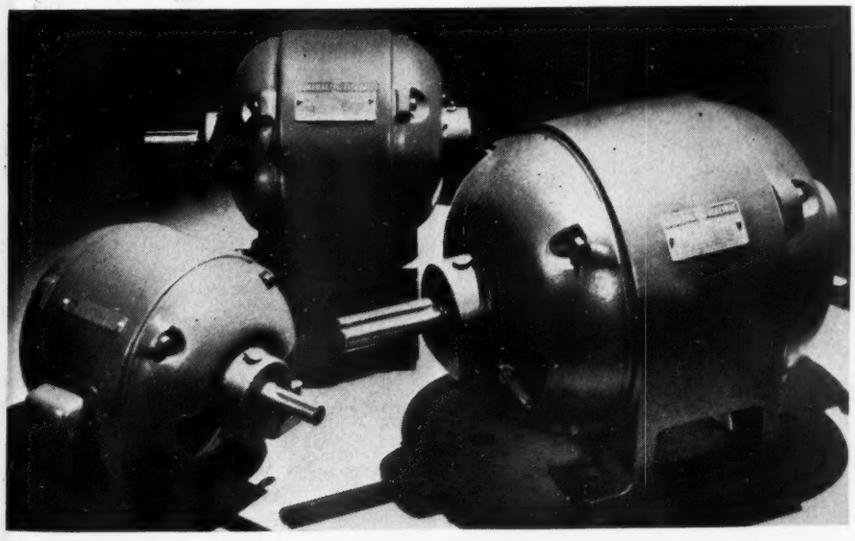
199. **Globe Steel Tubes Co.,** Milwaukee, Wis.—Samples of seamless steel tubes.

200. **Economy Engineering Co.,** Chicago, Ill.—Materials handling equipment including a rocker for drums, lifters and trucks.

201. **Thomas A. Edison, Inc.,** Instrument Division, West Orange, N. J.—Measuring and controlling instruments including thermostatic steam valves, sealed thermostats and relays and thermometers.

202. **Haveg Corporation,** Newark, Del.— Centrifugal pumps, filter press plates, ventilating fans, condensers, exhausters, valves, fittings and floor coverings.

203. **Air & Refrigeration Corporation,** New York, N. Y.—An air conditioning unit will be in operation.



Tri-Clad induction motors exhibited by the General Electric Co.

The Frantz FerroFilter catches particles as small as one micron. This is a pipe line type, Model BP, entirely inclosed and can be used under vacuum or pressure.

"No-Foam" Super-Centrifuge for clarifying liquids out of contact with air, made by The Sharples Corp.

204. **Allis-Chalmers Mfg. Co.,** Milwaukee, Wisconsin—Three of the newest products will be exhibited—the Vari-Pitch Speed-Changer, the side opening Low-Head Sifter and the "Electrifugal." A general picture story will represent the balance of the exhibit. This will portray the uses of processing machinery for crushing, fine reduction, screening, sifting, washing and conveying; power and process steam turbines; electro-lytic plant rectifiers; hydro and steam station equipment; pumps, blowers and compressors; continuous solvent extraction equipment; motors and water treatment equipment.

205. The Cleveland Worm & Gear Co., Cleveland, Ohio—Speed reduction gears.

206. Globe Steel Tubes Co., Milwaukee, Wisconsin—Seamless steel mechanical tubing, pressure, alloy and process tubing and a display of the Ihrigizing process (silicon impregnation).

207. The International Nickel Company, Inc., New York, N. Y.—Technical literature describing metal properties, uses and working instruction. Monel, nickel, Inconel and other nickel alloys will be on display.

208. Pittsburgh Equitable Meter Co., Pittsburgh, Pa.—Representative types of liquid meters, Emco gas meters and gas pressure regulators.

209. The Reineveld Corporation, Philadelphia, Pa.—Centrifugal filters and separators.

210. John A. Roebling's Sons Company, Trenton, New Jersey—Filter wire cloth, industrial wire cloth, wire rope, insulated wires and cables, flat and round wire.

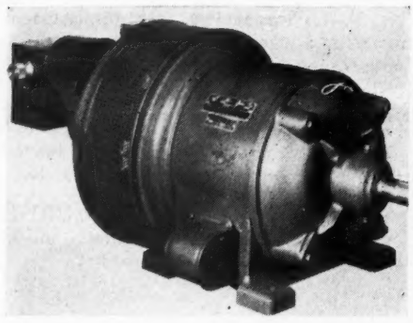
211. E. H. Sheldon & Co., Muskegon, Mich.—Laboratory furnture, including tables, sinks, water, air, vacuum, electric and ventilation services.

212. Hillis-McCanna Co., Chicago, Ill.—Glass-lined valves and pumps—including the "UM" and "RM" proportioning pump.

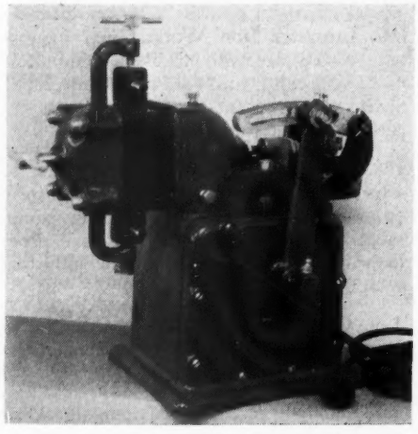
213. Waukesha Foundry Company, Waukesha, Wisconsin—Ball bearing all-purpose sanitary pumps, corrosion resistant, variable capacity with direct connected Reeves "Motodrive," geared head motor and V-belt drives. Corrosion resisting castings.

214. Wallace & Tiernan Products, Inc., Belleville, New Jersey—Microbiological control equipment as applied to process and cooling water. Small diaphragm type reciprocating pump for feeding chemical solutions, particularly corrosive liquids.

215. Lukens Steel Company, Coatesville, Pa.—Informational exhibit on Lukens "Nickel-Clad" steel, "Inconel-Clad" steel and "Monel-Clad" steel. Motion picture, "World's Largest Plate Mill," depicting operations in the plant.

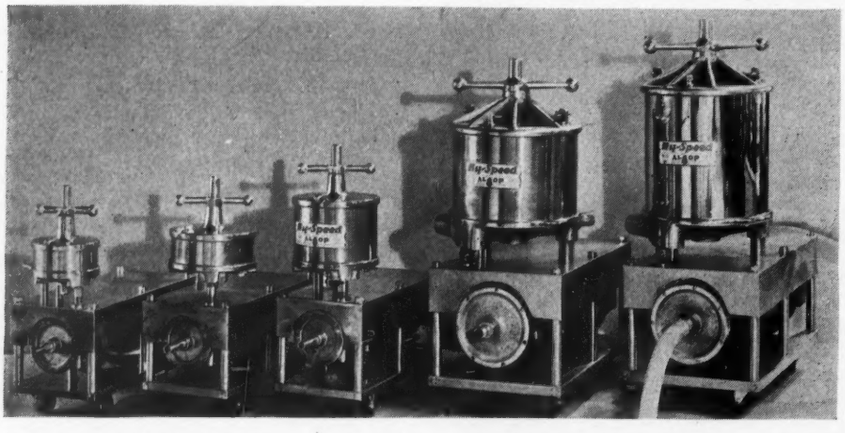


The Adjusto-Spede, made by The Louis Allis Co., is a clutch motor employing a governing device for maintaining constant speed under varying load conditions.



A small diaphragm type reciprocating pump for feeding chemical solutions, particularly corrosive liquids, made by Wallace & Tiernan Products, Inc.

216. Oliver United Filters, Inc., New York, N. Y.—A variety of filters including the Oliver "Precoat" filter. This filter is said to operate practically continuously and automatically with an always clean surface of precoat for cake deposition. It may be operated with vacuum or pressure. Also a diaphragm slurry pump and acid pump.



Different size standard SD filters, made by Alsop Engineering Corp., complete with pump and motor. These motors are protected from corrosive liquids by portable splashproof stands.

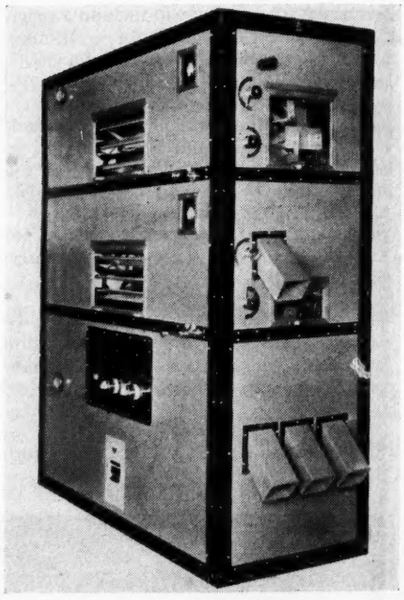
217. American Engineering Co., Philadelphia, Pa.—"AECO Lo-Hed" electric hoists, both in operating and non-operating positions.

218. Black-Sivalls & Bryson, Inc., Kansas City, Mo.—"Safety-Head" pressure relief device and combination "Safety Head" relief valve units. Also "Trans-o-lite" photographs of these safety devices as well as photographs of other equipment.

219. Hercules Powder Company, Wilmington, Delaware—A booth made almost entirely of plastics will house this exhibit. Among the materials that will be shown are Parlon, chlorinated rubber, chemical base for concrete paints, cellulose acetate plastic base, ethyl cellulose, pine oil, Poly-pale resins, synthetic resins, Vinsol resin, chemical cotton, paper-making chemicals and liquid terpene chemicals.

220. Carpenter Container Corporation, Brooklyn, New York—Corrosion resistant fiber drums.

221. Jay Bee Sales Company, Utica, New York—Hammer mills employing the "air-float" system or grinding on air. Mills for both laboratory and industrial uses.



"Electrofloat Separator," an electrostatic machine for removing dirt from seeds and similar food products, made by Sutton, Steel & Steel, Inc.

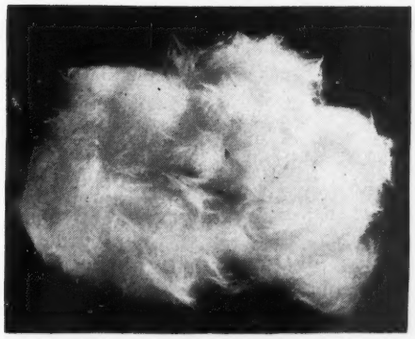
222. The Pioneer Rubber Company, Willard, Ohio—Informational and actual exhibit of "Stanzoil" neoprene gloves used for protecting workers' hands when exposed to harmful industrial chemicals.

223. Eimer & Amend, New York, New York—Exhibit held in conjunction with Fisher Scientific Company. See No. 55.

224. Sowers Manufacturing Co., Buffalo, New York—Model of "Dopp" positive-scraping mixer in action. Also photographs and charts showing installations of other types of seamless jacketed mixers.

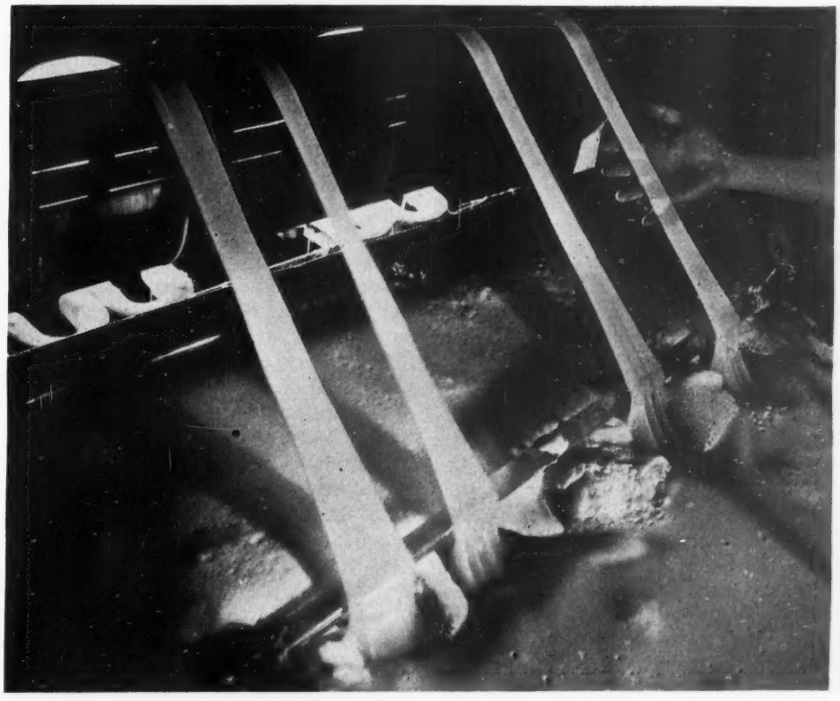
FROM COW TO CLOTH

Important new byproduct of the dairy industry—casein fiber—has been developed and put into commercial production. To be used by textile industry, it will create a new market for surplus skim milk



Finished casein fiber, cut into short lengths and ready for blending with other fibers for use in the textile industry. It can be cut to any desired length from half an inch to half a mile.

The "Aralac" strands pass from the spinnerets up and out of the chemical solution and over a roll. The hand at the right indicates the translucency of the fiber.

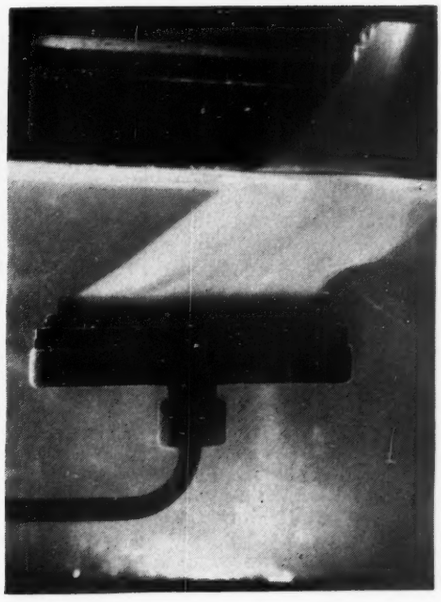


SUCCESSFUL processing of a new textile fiber for which skim milk is the raw material is announced by National Dairy Products Corp., New York, after four years of experimentation. Made from casein, the new material is a protein fiber of the prolon family and is called "Aralac." It can be blended with wool, mohair, cotton, rayon or fur in varying proportions. The fiber is more expensive than rayon and cotton but cheaper than wool and fur. It is said to impart distinctive characteristics to fabrics in which it is used.

This development is significant to the food industries in that it provides a new outlet for skim milk that may conceivably reach important proportions. Formerly, billions of pounds of skim milk, about 80 percent of the nation's output, did not have a commercial market, and most of it has been used as livestock feed. Most of the casein made from skim milk has been used in the paper-coating industry, with some going into plastics and paints.

"Aralac" is being manufactured at Taftville, Conn., by Aralac, Inc., a special manufacturing division established by National Dairy. The present production capacity is about 5,000,000 lb. a year—the recoverable casein content of 160,000,000 lb. of skim milk. The factory has been operating on a 24-hour basis for more than four months, following more than two year's pilot-plant operation at Bristol, R. I.

The first step in making the new casein fiber is separation of casein from skim milk. The milk is heated to 95 to 118 deg. F. and treated with acid, producing curds and whey, as illustrated here.



Converting the viscous casein to fiber. It is forced under high pressure through the multitude of tiny holes in a spinneret immersed in a chemical solution. Thousands of separate strands are formed by each spinneret.

MACHINE HAS MAN TROUBLE

By G. T. REICH
Technical Director, Pennsylvania Sugar Co., Philadelphia, Pa.

This story is most amusing, now. But it was far from funny when it happened. And it might happen to you, for it all grew out of the fact that a more efficient process introduces human as well as technical problems. The workers tried to "frame" the machine they feared would do them out of their jobs.

YOU can be steeped in the principles of food technology, and know each and every unit process and unit operation, as well as how to make each one do exactly what you plan it to do —yet, you have to know a lot more to make a continuous process a success. For instance, it is necessary to know how to win the confidence of all the workers, and the management of the company must convincingly persuade the employees that a new continuous process is to their advantage as well as the company's. Lacking this the new process may fail. In other words, there is a human side to continuous processes, especially when they are first put into operation.

For instance, in the April, 1939, issue of FOOD INDUSTRIES was described our new continuous process for the manufacture of cranberry sauce, showing in considerable detail what improvements are made possible by the change of a batch process into a continuous process. Yet, though technical facts were enumerated in that article, another and equally important side was not even mentioned—the human problem. A variant of the French proverb, *L'homme propose, et Dieu dispose* (Man proposes but God disposes), might be properly applied to the situation since, in this case, the operators did the disposing. Their antagonism to the innovation nearly put the new process into the discard. The story of how this opposition was converted into cooperation, resulting in ultimate profit to the workers as well as to the entire enterprise, will help others to meet this problem when it arises—or before it arises.

In spite of foreseeing that the operators of the old batch system would erroneously surmise that they would lose their jobs, and in spite of attempts to forestall that notion, those operators resisted the change with an ingenuity that could better have been applied to constructive thinking. On paper it had been demonstrated that a continuous process was preferable to the batch process for the manufacture of jelly. Owing to the existence of many unknown factors, we had prepared to build a machine for continuous production at a computed rate of but 50 percent of the existing normal capacity of the batch equipment. As a precautionary measure, the foremen and other interested parties in the plant were consulted well in advance of installation of the new machine. Everyone agreed on the 50-percent figure. And right there our troubles started. For every one of the operating crew had that 50-percent idea fixed firmly in his mind, and despite assurance from the management that no jobs would be lost as a result of the new machine, none of them would believe that this guarantee would hold if the apparatus were operated beyond the rated capacity.

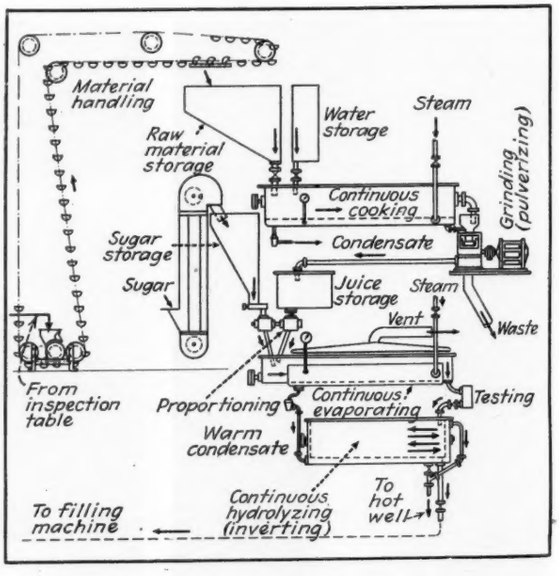
When the new equipment was ready to start, it went through all the travail of infancy, comparable to children's diseases such as measles and chicken pox, to say nothing of the more homely everyday problems with which all parents are acquainted. But we nursed the new process along to the point where it would turn out the calculated 50 percent production. Even then the operators eyed it with great disfavor, imagining that it meant an end to their jobs.

Great resourcefulness was required by management to get any needed repairs made quickly; and to get the full co-operation of the working force, especially when it was necessary to work overtime. Between natural accidents and breakdowns and those which were planned by the operators, it was a pretty lively place.

Perhaps because we were in uncharted territory we did not design and install all of the needed accessory equipment that is required in a continuous process. If, for example, we had put in automatic conveyors to feed sugar to our new machine we might have avoided one problem. But this process was so new that we felt it was wisest to begin with the continous machine alone and later add the accessories—again failing to foresee all the human problems.

Sugar and cranberry juice were fed to the machine by a specially designed proportioner, a unit which is often the heart of a continuous operation. Since the first runs were really only trial runs, the conveyor for sugar was omitted. Man power was utilized for the job. The handy men loaded a dozen sacks of sugar onto a truck, lifted it to a platform, and from there dumped the sugar into a bin. The job of loading, lifting and dumping sugar at the rate of 8,000 lb. per hour (at the 50 percent rate of operation) appeared to the men to be a tolerable task.

On the floor below the sugar bin, one operator watched the proportioner-feed flow to see that nothing went amiss here. Another operator manipulated the steam valve, keeping an ear cocked for the familiar sound of the filling line. For it must be remembered that if anything prevented the continuous removal of the finished product the



Flow sheet for continuous cranberry jelly process.

whole process must be stopped instantly or a flood would ensue.

After coordinating and synchronizing the work of the sugar loaders, feed and evaporators, we were able to produce somewhat more than the rated 50 percent of normal production. But the can-filling machine refused to be pushed, and this would happen at a time when the operator, on whom we had to depend for shutting down the machine, had "a call to preach." Lo! and also behold! We were soon surrounded with a nice red skating rink of jellied cranberry sauce, thereby proving the smooth and velvety consistency of our product. And, of course, it would happen when a coterie of cynical observers was on hand.

Cleaned up, we started again, bent but not broken. Because the design of the apparatus permitted complete separation and control of the unit operations, evaporation and inversion, we believed that the process would produce far more than the 50-percent of normal plant output. But the operators had a different idea. Discussion with them was of no avail. The machine had been designed for 50 percent production, and that was all they intended to get out of it.

"The operator on whom we had depended for shutting down the machine had 'a call to preach.' Lo! and behold! We were soon surrounded with a nice skating rink of jellied cranberry sauce, thereby proving the smooth and velvety consistency of our product. It would happen when cynical observers were on hand."

Workers "Frame" Machine

Management was also confronted by the peculiar fact that production yield by the new continuous process was invariably less than by the old batch process, despite the apparent use of the same amount of sugar and fruit. In an effort to ascertain the cause of the decreased yield, the production manager issued instructions that the empty sugar bags from morning production be piled separately from those of the afternoon production, and neither were to be moved until he so ordered. During the noon shutdown, and again after closing hours at night, the manager carefully checked the number of bags of sugar used. Each day a production report went to the office showing the quantities of ingredients used. This check-up was carried on for a full week, presumably without the knowledge of the operators. Upon comparing the production manager's report with the operators' report we found the source of the diminished yield.

In each test report, the operators, believing that the machine would ultimately cause them to lose their jobs, took it upon themselves to juggle the figures.

Without making any accusations, a little get-together was called. The production manager held a serious talk, like a father to his sons, and the operators at once surmised that their little scheme had been discovered. But, nevertheless they at once gave wholehearted cooperation in making the machine produce satisfactory yields in accordance with its design. And it proved its merit in this respect.

Then we decided to make a test to see if the machine could produce 100 percent of normal plant production. This led to opposition on the part of all the employees. One operator expressed the definite opinion that the machine would not, and could not, produce the entire normal factory output. So we started the test by making sauce at half the normal output, and everybody felt happy. Our plan was to step up the rate of production by successive 5 percent increases every 10 minutes so that we would soon be able to learn the limit of the producing capacity of the equipment. Again, antagonism by the operators compelled us to minimize the rate of increase. While the increase in the rate of production was 5 percent, we created the impression that it was only 1 or 2 percent. But when it had actually—not apparently—reached 80 percent of normal capacity, the handy men who fed the sugar bin protested vigorously, saying that they were being overworked. (Conveyors would have avoided that problem.)

Up to this time operations had been running smoothly until we now noticed that the Brix (specific gravity) of the product began to drop. The Brix reading is an important factor in quality control. With constant steam admission to the evaporator, this Brix drop could mean only one of two things—either a decrease in the rate of feeding the sugar, or an increase in the rate of feeding the liquid (fruit juice). The operator who regulated the proportioner was then instructed to reduce the rate of feeding the liquid. In spite of this the Brix continued to drop. It fell so suddenly that we were unable to produce a product that would jell. In the investigation that followed it was found that the operator had gone contrary to instructions and had increased the rate of liquid flow, well knowing what the effect would be, and hoping thereby that he could prevent the production of more than 50 percent of normal output.

All's Well That Ends Well

Since every good story ought to have a happy ending, so it is with this one. The machine now processes the entire output of the plant. Each of the 12 steam-jacketed kettles that were released from production by the continuous process has been put into service to make two new products—clam chowder and potato salad. Instead of a reduction in the plant working force, there are now twice as many operators employed as prior to the installation of the continuous process.

Furthermore, instead of working only seasonally, the crew now has employment the year around.

But it was a tough job to win the cooperation of the operators and convince them that they would still have employment in the factory even though the continuous process itself needed only the service of a few of them. There is a human problem in a continuous process which requires more than mere food technology for its solution.

How Eggs Are Dried—Methods and Standards

By HARRY ALFRED MULVANY
Consulting Engineer, San Francisco, Calif.

With demand for dried egg products suddenly increased by more than 1,200 percent, because of Lease-Lend and defense requirements, those forced to carry out the expansion can profit from the author's experience in this industry and his suggestions for improved methods

DRIED egg shipments to Great Britain on account of Lease-Lend are expected to total 100,000,000 lb. by July 1, 1942. When it is recalled that about 2,000,000 lb. of dried egg products were produced annually in this country until this year, and that within one year production is to be raised to at least 150,000,000 lb., it is seen that the industry is faced with a stupendous task.

Heretofore, checked eggs, dirty eggs and eggs of low quality were used in frozen and dried products. These eggs are definitely barred by the Surplus Marketing Administration from production for Lease-Lend shipments. An inspection service has been set up by the agencies of the Department of Agriculture, with laboratory facilities to test all shipments before delivery.

For dried yolk, the moisture content cannot be more than 5 percent, while for dried whole egg a moisture content of 8 percent is allowed. It is my opinion that 8 percent is too high, and that 6 percent would be safer when the product is to be shipped or stored without refrigeration.

The question is naturally asked, what is to become of this expanded industry after the present emergency has passed. With the contemplated drying capacities, it will be necessary to operate on a 24 hour basis to produce 150,000,000 lb. of dried egg products a year. If the same plants were to be operated on an eight hour basis during the four months of each year of maximum egg production, they would produce about 17,000,000 lb. of product. If the quality of the product is maintained in accordance with SMA requirements, it is probable that our own country could consume this production, and possibly more.

Where Eggs Are Dried

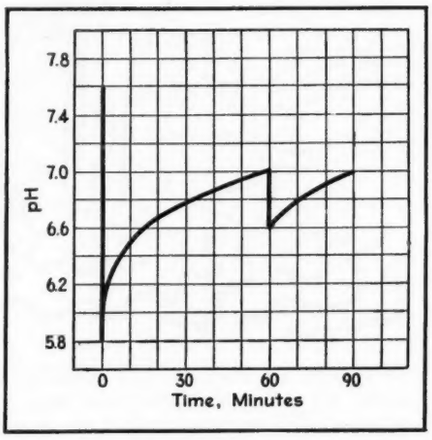
The art of drying eggs is an old one. In this country, egg drying was started in the Middle West about 36 years ago. However, a cheaper shell egg in China, with no protective tariff here, soon put an end to egg drying in this country. A number of American manufacturers moved both plants and equipment to China. Soon China was supplying the world with dried egg products.

In July, 1931, the 18 cent tariff then in force on dried egg products was raised to 27 cents per lb. In 1930 ten million pounds of dried egg products had been imported by this country, but the imports dropped to three million pounds in 1932. Gradually, imports increased again, until 1937, when 8,871,000 lb. of dried egg products came in from China. Thereafter, the Japanese invasion of China, and low prices at home, cut importations to a figure of 1,245,000 lb. in 1939. By 1938, low domestic egg prices and lack of imports from the Orient, stimulated the drying of eggs in the United States.

Types of Dryers

Three commercial methods of drying eggs are in use. First, there is the pan dryer, producing the "crystal" or flaked egg. In this method, a thin layer of liquid egg is poured into a shallow metal pan that has been oiled. This pan is placed on a shelf in a tunnel dryer, through which filtered air at 120 deg. F. is circulated for 18 hours. During the next 40 to 45 hours the temperature is raised to 140 deg. F. The pans are then removed from the dryer and left on tables for another 24 hours before the dried egg is removed and packaged. This method was popular in China and about 90 percent of our imported product was dried in this manner. If this method has no other drawbacks, the high labor cost should make it unpopular in this country. But there are some of these plants in operation in the United States, turning out "crystal" egg albumen, because of the demand for this product.

A second system of drying, developed about 1903, is the belt system. Metal belts about 4 ft. wide are run through tunnels at low speed. The egg is poured onto these belts. Within the tunnel, heated air is circulated over the belt at 160 deg. F. This method produces flaked yolk and flaked whole dried egg. It has little value in drying egg albumen, as the liquid albumen will not stick to the belt.



Changes in albumen after being acidified, with temperature at 135 deg. F., under reduced pressure and agitation, in accordance with the McCharles and Mulvany patent.

The third, and by far the most satisfactory, type of egg dryer, is the spray dryer. There are two types of these dryers: The tunnel or chamber type, in which heated air passes through a cham-

ber containing spray nozzles; and the cyclone type, in which the egg is sprayed into a whirling current of air in a tower or similar structure.

In the first type of spray dryer, the air passes through an air filter to a fan which delivers it through steam heating coils to the drying chamber. When the spray of eggs comes into contact with this heated air, the egg is immediately dried and drops to the floor. In some dryers it is permitted to accumulate there until about 4 in. deep. Then the dried egg is shoveled out. Other dryers have automatic means for continuously removing the dried egg from the floor into containers. After removal from the dryer, the egg powder is sieved, weighed and packed.

Adjoining the drying chamber of this dryer is a dust collecting system. Here a series of screens and cloth filter bags collect whatever powder is carried over with the heating air from the drying chamber by the exhaust fan attached to this chamber. The fan is operated in connection with a damper. As the static pressure rises in the dryer, it is necessary to shake down the bags and remove the dried egg from their surfaces. This is generally done by some automatic tapping means.

When this type of dryer is used in drying whole egg, but little egg reaches the bag house. About 75 percent or more is recovered in the first chamber. The same is true of yolk. However, in the case of albumen drying, possibly 40 percent will accumulate in the bag house. There should be at least 1 sq.ft. of bag surface for every cubic foot of air handled.

In the cyclone type of spray dryer, the air filter, fan and heating system do not differ greatly from those of the chamber system. With this dryer, there is a saving in floor space. However, it generally requires two or more stories of a standard building to house such a plant.

Log of Dryer in Photographs, Drying Yolk and Whites

Date	Cases of eggs	Liquid yolks in lb.	Pounds per case	Liquid whites in lb.	Pounds per case	Yolk powder recovered in lb.	Percentage yolk recovered
July 1	246	3890	15.8	4410	17.9	1746.0	44.8
2	242	3827	15.4	4410	18.2	1758.0	45.9
3	179	2699	15.0	2640	14.7	1169.0	43.3
6	262	4171	15.9	4470	17.0	1807.0	43.3
7	258	4200	16.2	4140	16.0	1793.0	42.6
8	264	4145	15.7	4470	16.9	1837.0	44.3
9	265	3996	15 1	4350	16.4	1770.0	44.2
10	242	3705	15.3	3900	16.1	1651.0	44.5
12	288	3920	....	4350	15.1	1728.0	44.0
13	277	4283	15.4	4710	17.0	1902.0	44.4
14	297½	4672	15.7	5400	18.1	2160.0	46.2
15	284½	4410	15.5	5130	18.0	1980.0	44.9
16	222½	3390	15.2	3510	15.8	1508.0	44.4
17	281	4323	15.3	4920	17.5	1947.0	45.0
19	292½	4332	14.8	4920	16.8	1950.0	45.0
20	281	4007	14.2	4530	16.1	1812.0	45.2
21	114½	1631	14.3	1905	16.7	742.0	45.4

Albumen

Date	Pounds of liquid egg white	Drying time (minutes)	Powder recovered in lb.	Percentage of solid per pound of liquid dried
July 27	3,900	540	495	12.6
28	4,500	730	561	12.4
29	4,500	680	576	12.8
30	4,500	635	560	12.4
31	4,800	715	610	12.7
Aug. 2	3,300	540	417	12.6
3	1,500	385	186	12.4

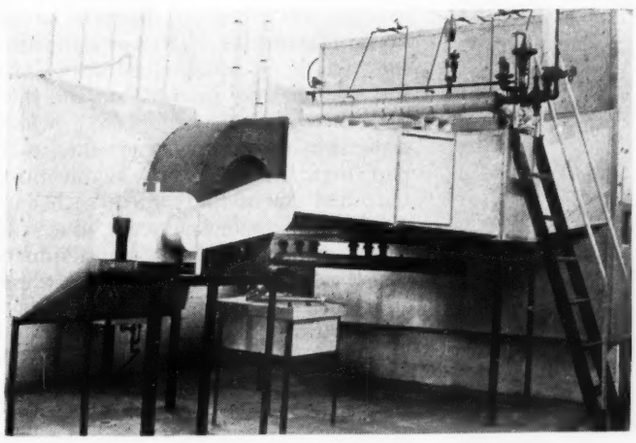
Operation of Cyclone Dryer

As the egg products are dried in a cyclone dryer, the centrifugal force of the whirling current of air carries the particles of dried material to the sides of the dryer. These particles follow a spiral course and are discharged through an opening to the bottom of the cyclone chamber cone. Some dryers of this type have chains and scrapers to free the particles from the side wall. A bag house similar to that of the chamber type dryer is used.

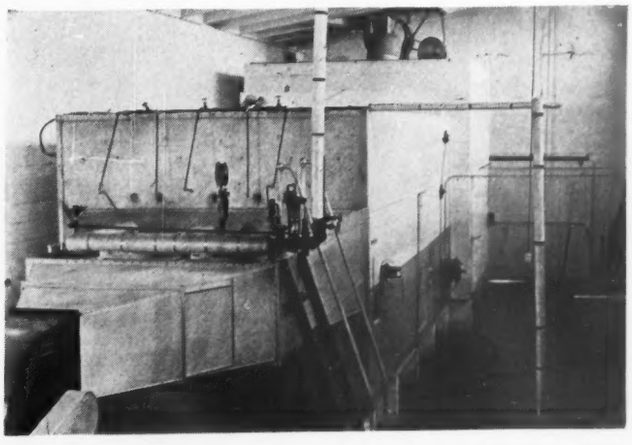
Drying efficiency of both types of dryers will depend upon the design and the insulation of the exposed parts.

To determine the quantity of air to be used in a spray dryer, we know, assuming that we start with 60 deg. F. liquid egg, that for every pound of water to be evaporated from the egg products it will be necessary to supply 1100 B.t.u., plus heat to replace losses from radiation, and the heat used in heating excess air. Since the specific heat of air is known, and it is necessary to assume the relative humidity of the air, it is not a difficult matter to calculate the quantity of heated air required and the temperature needed to dry any given quantity of egg material.

The spray nozzle is arranged to throw the finely divided particles over as large an area as possible. The size of hole used in the nozzle for this purpose is that drilled with a No. 72 drill, although there are nozzles on the market using larger holes and a whirling attachment. The nozzle disk carrying the hole is arranged for easy replacement, as egg products at high pressure cut the holes away rather rapidly. A pressure of from 1,500 to 6,000 lb. per sq.in. is used for spraying. The pumps to develop this pressure usually have nickel-chromium cylinders and stainless steel pistons. As these pumps give considerable trouble because of the severe service, a plant that is to operate



Small egg drying plant, capacity 200 lb. whole egg powder per hour, showing air filter, blower and steam heating chamber, at spray end of dryer.



Small egg drying plant, capacity 200 lb. whole egg powder per hour, showing hot air inlet, spray drying chamber and bag house. Note the removable high pressure nozzles over air inlet.

24 hours a day should have at least one spare pump.

Centrifugal spray heads have been used in place of the high pressure pump and nozzle. In these, the liquid egg falls on a disk that is rotated at high speed and centrifugal force breaks it up into a fine spray. These disks are driven close to the limit of strength of the material from which they are made, from 10 to 25 hp. being employed for the purpose. It is claimed that the disks give fewer mechanical difficulties than the high pressure pumps.

Drying Whole Eggs

Dried whole eggs are to be used during the present emergency as high fat and high protein food products. As there are no requirements other than purity of product, moisture content, and percentage of fat, it is not necessary to pretreat these eggs before drying. However, if this product is to be held for any length of time before drying, it should be held at low temperature. The high percentage of albumen mixed with the yolk brings the total solid content to a point that is satisfactorily handled in a spray dryer.

Drying of Yolk

Care must be exercised in separating yolk from the albumen. If too much albumen drains into the yolk, it will throw the solid content off (43 percent solids is required in the Government pack). Some driers mix water with the yolk before pumping it into the spray dryer. If this material is dried down to 5 percent, or less, moisture, in general an excellent product results.

As much of the albumen used in this country has been in making candy and meringues, whipping or swelling properties are of the greatest importance. The fact that most of the imported product had an odor, ranging from stale beer to dead fish, brought no more than a mild protest from the manufacturers, as long as they could disguise the odor with flavorings.

Dried albumen, untreated or unfermented, will not whip when reconstituted. The oriental method of preparing egg whites consists of separating the albumen from the yolks, then pouring it through a fine sieve into wooden casks, each holding about 700 lb. The fermentation that occurs is uncontrolled. Unlike wine making practice, the egg white is not innoculated with a known strain of ferments. There are a number of organisms functioning at the same time.

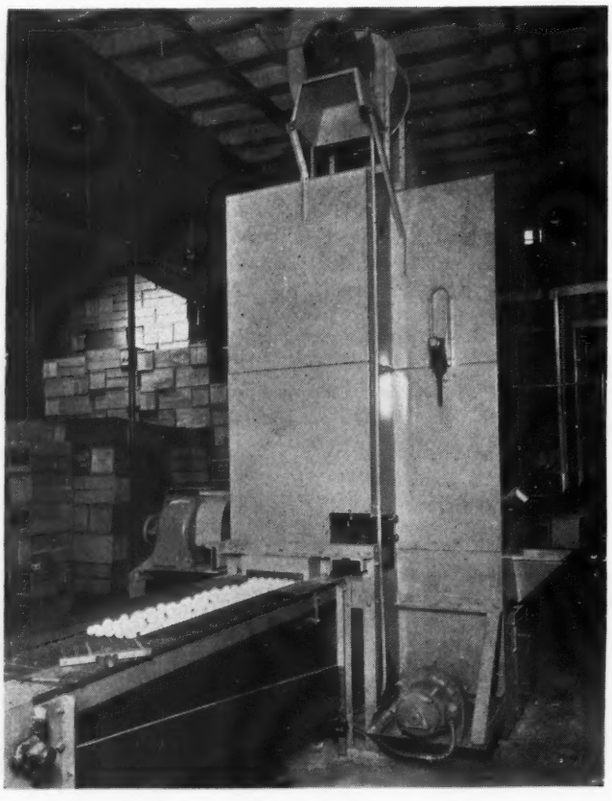
The fermentation goes on for 36 to 60 hours, depending on the temperature and the type of organisms at work. Putrefactive bacteria cause the repulsive odor associated with this fermentation process.

When the fermentation is complete, the foam at the top of the cask is skimmed off and the liquid drawn off to within 3 in. of the bottom. The 3 in. at the bottom of the cask is discarded. To check further fermentation, about 2 oz. of aqua ammonia and 3 oz. of alcohol per 100 lb. of albumen is stirred in. This "oriental method" is also used in this country.

Recently, steps have been taken in the United States to improve the pretreatment of albumen. Messrs. A. K. Balls and T. L. Swenson of the Department of Agriculture have developed a process in which enzymes are used. It is said that this process brings about desirable changes in a short time. Other attempts are being made to use types of organisms for fermentation that will eliminate the repulsive odor.

The writer, and the late H. C. McCharles, who was chief chemist for the Food and Drug Division of the State of California, reasoned some years ago, that if it were possible to determine the desirable changes brought about by fermentation, then it might be possible to effect these changes without fermentation.

We found that by taking fresh eggs that were slightly alkaline, and acidifying them to about 5.8 pH, then agitating at elevated temperature in a vacuum, the pH returned to the neutral point in about 60 minutes. We found that this treatment could again be repeated. When this product was spray dried, after this treatment, good color and excellent whipping properties resulted. Samples of this product that have been held for four years at room temperature still have excellent whipping properties and have darkened in color very slightly. There is nothing taken out, or any loss in this treatment. All of the albumen is dried. As the process is done in a vacuum, foaming is avoided. Holding this product at a temperature close to the coagulation point will destroy many bacteria. The resulting product has no odor other than the odor characteristic of eggs and the bacterial count is below that of certified milk. The moisture content is between 8 and 10 percent. The process is covered by U. S. and foreign patents.



Wet sander for cleaning 100 cases of eggs per hour, with take-off conveyor extending 40 ft. through plant.

Breaking-room Practice

Egg breaking differs greatly in various parts of the country. One large Middle West manufacturer uses buckets. Eggs are brought to the breaking tables in standard galvanized buckets by an overhead conveyor. The girl stands before a table on which is a tray, a knife for egg breaking mounted on the tray, and three cups. In breaking whole eggs, she breaks three eggs into each cup, then lifts the tray with the three cups and smells the eggs in each cup. If she was separating eggs, one cup would contain yolk, one cup albumen, and the third cup contain egg in which the yolk was broken.

Eggs are placed in the buckets in the candling room. The operator picks up 5 eggs at a time and flashes them before a candling light. She can only hope to pick out the "black rots" at such a high rate of speed. The case

(Turn to page 102)

Right Way to Make Processed Cheese

BY C. R. BARKER
Oak Park, Ill.

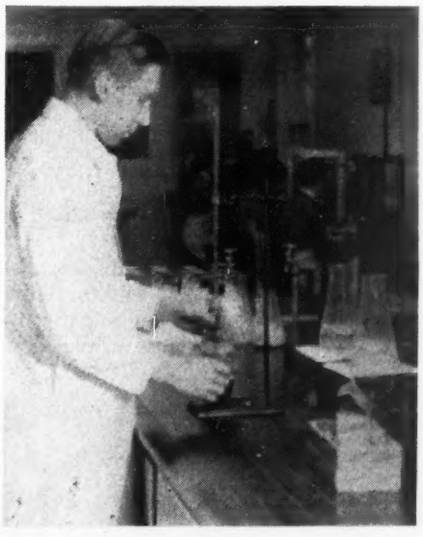
It's a science, not an art. True, rule-of-thumb practices sometimes produce a satisfactory batch. But if the quality is to be consistently good, there must be technical control over materials and processes. The author tells you how it's done.

IN spite of ideas to the contrary, successful processing of cheese, like that of other foods, involves nothing more mysterious than the application of good technology. Familiarity with the art helps in getting the desired results. But, unless one understands the technology involved and applies his experience or art accordingly, he is headed for trouble.

As in other foods, flavor and consistency, or body, are highly important qualities in processed cheeses. Uniformity is most important. In fact, lack of uniformity in bulk cheeses is one of the several reasons why processed cheeses have become a staple grocery commodity and now constitute about 35 percent of all cheeses produced in the United States. To get the desired essential qualities, intelligent blending, critical cleaning and trimming, coarse to medium grinding, controlled heat treatment or cooking, thorough stirring or mixing and protective packaging must be practiced.

In the selection of bulk cheeses to be blended there are two grades of cheese which should be watched carefully and used with discretion. They are "current" or fresh cheese, which is tough, and "acid" cheese, which crumbles and breaks easily when pressed between the thumb and fingers. Too much of either will spoil the finished batch.

The base of a batch should be "short-held" cheese, anywhere from one to three months old. It will have a smooth texture and will become butter-like when subjected to pressure. A quick rule-of-thumb test can be made upon a plug of cheese by squeezing it between the thumb and finger. If it is not of the right age, it will be sticky or rubbery in resistance to pressure. If it is too old, it will crumble.



Technical control involves access to, and almost constant use of, a well-equipped and capably staffed chemical and bacteriological laboratory.

Preliminary to blending of cheeses from various lots to make up a batch, each cheese should be plugged and examined as a precaution against mixing in an inferior lot under a misleading identification date.

"Storage" cheese, which is about six months old and well broken down in body by enzymic action upon the compressed milk curd, can be used with a short-held cheese. The total amount of short-held or of short-held and storage cheeses should make up approximately 70 percent of the batch. Storage cheese can entirely replace the short-held variety as a base, if necessary. In that case, it must be smooth, not crumbly, and have a mild aged flavor.

Current or fresh-made cheese that is tough should never be used as a base stock. It is possible to use about 15 percent of current or tough cheese in a batch. But whenever tough cheese is used, care should be taken to avoid tiny lumps in the finished product. Here is where the experience of one skilled in the art of making processed cheese gets in its good work.

The experienced processor will also know how much acid cheese to use to keep out of trouble. He will not use acid cheese to break down tough cheese, but will use it for what it is and for how it can be blended into the batch to give a satisfactory finished product. It is best never to use over 12 percent of acid cheese in a batch. That percentage is not arbitrary but depends upon the experience and skill of the operator in charge of blending. Cheese "on the acid side" is an asset and can be used for flavor; however, cheese on the acid side never means acid cheese. Acid current cheese should never be used. It will give the finished product a color which will vary all the way from a straw shade to a deep pink. Acid cheese should be at least eight weeks old when used even by an experienced operator. Acid cheese is always a handicap to be disposed of in small quantities. Also, a tough cheese, long and shreddy, does not neutralize an acid cheese. Tough cheese is an asset only when handled properly by one who knows how to get a smooth texture in the finished product.

Cheese "on the sweet side" and showing small round holes is always a good cheese and gives good body to the finished product. Use of 25 percent of such cheese is preferred at all times. It is needed in a high-quality loaf.

A Good Blend

In the hands of an experienced man the following cheeses will make a good blend: 70 percent short-held cheese from one to three months old that breaks smooth, offers no firm rubbery resistance to the thumb and finger test, and runs 45 to 50 percent on the acid side and 20 to 25 percent sweet,

and is open in texture; 15 percent current cheese, and 15 percent acid cheese, short-held, at least 8 weeks old.

Standardized or routine making of processed cheese is impossible because of the variations in the bulk cheeses used as a base. These bulk cheeses are made under varying methods of manufacture with varying development of acid and microorganism content. Some of these microorganisms are of the undesirable types which produce gassy, off-flavored and poorly colored undergrade cheeses.

Since one of the reasons for processing cheese is to produce a finished product which will be the same in June as in December, critical care and

Grinding or grating the cheeses into a granular form prior to cooking promotes ease and speed in cooking as well as uniformity in blending.

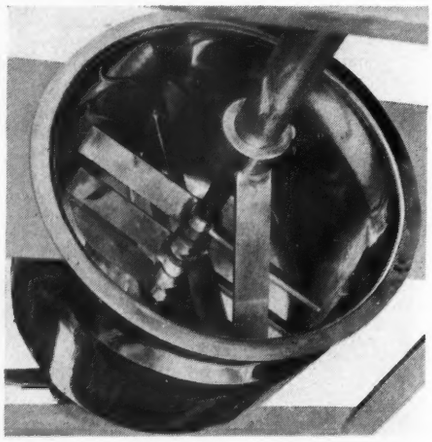
discretion must be used in the selection of the bulk cheeses used and in their blending. The usual batches of about 400 lb. for the small plant and 600 lb. for the large plant permit the blending necessary to get a base of the desired characteristics.

Successful blending is most likely to result when the cheeses used are obtained from five to seven different factories, preferably from different sections of the United States. When the bulk cheeses used weigh more than 60 lb., it is well to distribute them through two or more batches. At time of blending the cheeses should be around 70 deg. F. This temperature should be obtained over a period of 72 hours under room conditions after the cheeses have been brought out of cold storage. Blending cheeses direct from storage is not done by one skilled in the art. Cold or rapidly conditioned cheeses behave in a manner similar to current cheese.

A good precaution to take in making blends is to plug every cheese. This testing can be side-stepped if the processor is certain that a lot of cheese is running uniform. Dates on the cheese boxes can not be depended upon; sometimes an inferior lot is mixed in under several different dates.

Accurate weighing of the various cheeses used in a blend is an essential step towards getting final products of uniform quality.

Recommended procedure is not always followed by some who think that they know and understand how to make processed cheese. Those who depend upon their "art" alone work solely upon the basis of how much processed cheese is wanted as a finished product. Without regard for the quality or character of the bulk cheeses on hand, they order up enough bulk cheese to make that amount. If the batch does not run satisfactorily, they add an additional quantity of an emulsifier or of water. Such practices result in jumping from the frying pan into the fire. Cheeses made that way are never uniform and may even go bad on the dealer's counter. If the correct blend of cheeses is consistently used, variation in amount of an emulsifier and of moisture will not be necessary.



For batch cooking, a steam-jacketed kettle with an easily cleaned agitator is generally used. Kettles for different manufacturers vary somewhat in design but those suitable for processed cheese making have a valved bottom outlet.

The Best Procedure

One who follows best procedure first determines what is to be the desired quality and character of the finished product and works to that end in making his blends. If the cheese in process works up soft, the percentage of short-held cheese which is not fully ripened is increased and that of storage or fully ripened short-held cheese is reduced. The water content is not decreased below the recognized normal amount nor is tough cheese added. If the cheese in process works up tough, a reverse procedure is followed and without the addition of acid or an increase in water or emulsifier content.

Before the bulk cheeses are actually blended they must be thoroughly cleaned and trimmed to remove all of the cloth wrapping, paraffine coating and moldy or discolored spots. After cleaning they are ground just as meat is ground for hamburger or sausage. While some blending or mixing is done during the cleaning and grinding operations, the real blending takes place during the heating or cooking.

Application of heat may be had either by direct injection of steam into the cooking kettle or vat or by the use of a steam-jacketed kettle. In either case continuous agitation or stirring is essential, and the average finishing temperature should be approximately 160 deg. F. The processing temperature varies considerably, as different grades of cheese require different processing temperatures. Some will easily stand an initial temperature of 150 deg. F.; others will not, and for that reason have to be handled carefully. Controlled heating does not destroy the texture of well-made cheese; in fact, the character of processed cheese resembles that of the cheeses from which it is made.

In the first stages of heating a slight separation of butterfat takes place to give an oily appearance to the cheese particles. With the application of more heat the cheese becomes plastic and it is said to "pull up." Further heating and stirring result in a breaking up of the plastic condition, with the formation of a homogenous mass resembling the consistency of bread dough even to the point of being elastic and forming strands while hot.

Although 160 deg. F. is designated as the general level for a finishing tem-

perature, that level should not be regarded as definite. Since some cheese can stand more heat than can other cheese, the finishing temperature is very important and must be watched carefully. When a batch is finished, the cheese should make strands about 15 in. long. These strands should not be tough or rubbery, although they are somewhat elastic in character. There should be no free fat or free moisture. A noticeable gloss on the cheese is desirable.

Plasticizer Added

During the cooking stage an emulsifier or plasticizer is added to assist in getting a homogeneous mass with the desired texture. Those agents most commonly used are of an alkaline reaction and consist of sodium citrate, potassium tartrate, disodium phosphate and glyconates. However, some—such as ortho-, meta- and poly- phosphates and dibasic citric acid salts and a caseinate—have an acid reaction. The emulsifiers or plasticizers are generally used on the basis of 1 or 2 percent by weight of bulk cheese used. If too much is used, the finished product becomes stiff and coarse.

Sodium chloride (ordinary table salt) and water are also added in varying quantities during the cooking. Sodium chloride is added largely for flavor development, whereas the water is added to give the desired consistency or texture to the finished cheese.

As in the making of ice cream, mayonnaise and salad dressing, there is an overrun in the making of processed cheese. But not to such percentages. In fact overrun in cheese is only in low percentages while in ice cream it may be as high as 100 percent. This overrun is usually higher in cheese spreads and mixes than in American cheese. Overrun is something that one inexperienced in processed-cheese making does not take into account and that may be erroneously estimated.

Control over the amount of emulsifying agent used, of water added and of fat content of finished product, as well as over the degree of fat and moisture dispersion, is necessary for the making of good processed cheese. It is just as essential as control over the selection of the bulk cheeses used and the rate at, and temperature to, which the batches are heated. These controls involve access to, and almost constant use of, a fully equipped and capably staffed chemical and bacteriological laboratory.

Application of heat in the processing of cheese does more than merely aid in the blending and emulsifying of the batch constituents. It has a pasteurizing or partial sterilizing action upon the cheese mass to the end that the finished product may be wrapped and packaged in convenient-size units for either retail or institutional markets with very greatly reduced loss from fungus or bacterial decomposition.

Various patents have been granted covering processed cheese making. Some cover cooking in jacketed kettles, some in vacuum, and one covers a method which consists of passing a stream of cheese through a chamber, admitting steam to the chamber to reduce the particles of cheese to a substantially liquid state, and momentarily exposing all particles of cheese to the steam.

The patents covering cheese made in a jacketed kettle have expired, and this method can now be used by others providing they have a satisfactory method of packaging the cheese.

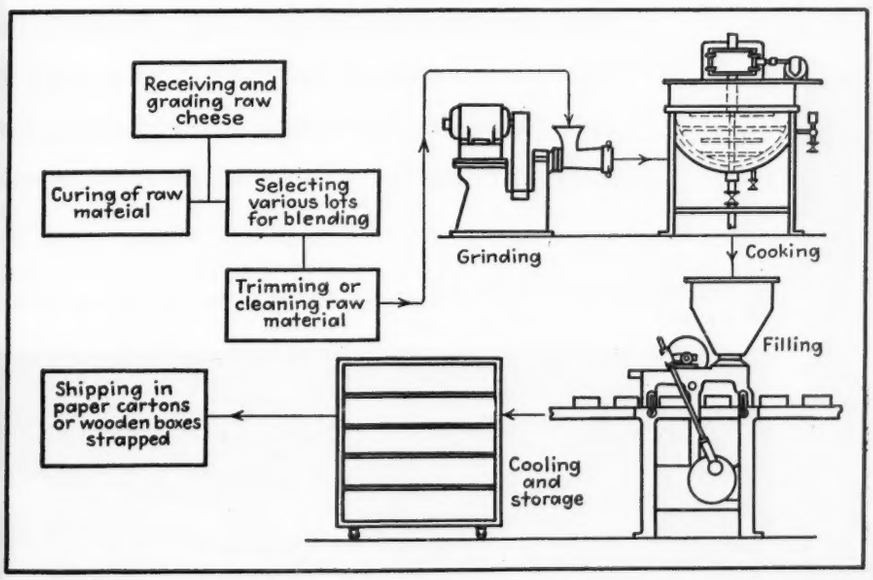
We have done a large amount of work with jacketed kettles to determine what are the objections to the method. We find no serious objections aside from cooking losses. These losses are much higher than would ordinarily be expected. A coating or layer, which we call "rind," is formed on the inside of the kettle and has to be scraped off. This causes a loss of 4 lb. in a 456-lb. batch. In addition, there is an evaporation loss of approximately 1¼ percent. If several successive batches were made there would be a considerable saving, as the kettle would be cleaned only after every third or fourth batch. In the continuous method there is the possibility of a saving resulting from the construction of the machine and the use of direct steam; cleaning is done only after the day's work is complete.

Packaging

Since the molten cheese mass is run directly from the cooking kettle through a filler into grease-resisting wrapper-lined molds, paper cartons or wooden boxes and sealed while hot, its retained heat has a steriliznig action upon the wrapping and packaging materials in which it is contained. In that way aseptic conditions of packaging are maintained until the cheese is fully packaged and ready for marketing.

Transparent wrappers are widely used for packaging processed cheeses and enable the manufacturer to give a very attractive package to the American housewife. In the beginning the equipment for filling the boxes and sealing

(Turn to page 102)



Flow sheet for processed cheese manufacture, for 2- and 5-lb. packages. With smaller packages, a carton-forming machine would be ahead of the filler and closing and wrapping machines after the filler.

At end of cook, the molten cheese mass is run through a filling unit into containers of a few ounces to 5-lb capacities and sealed while hot to prevent subsequent mold growths during storage and marketing.

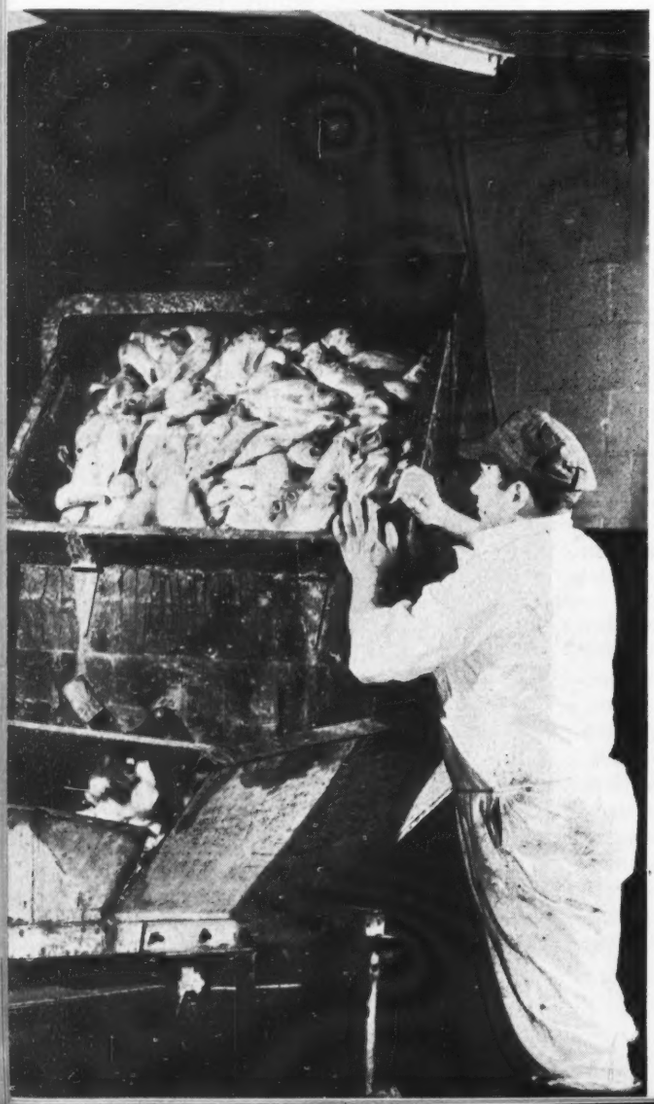
1 Fish fresh from the Atlantic Ocean are scaled and washed in this revolving screen. These fish have just been unloaded at the plant on the Boston Fish Pier from ocean-going fishing boats.

2 Looking inside the machine that knocks off the scales and sprays water over the fish. Imagine how long it would take to scrape the scales off these fish by hand.

PICTURES OF

How General Seafoods Corp., Boston, pre-
waste into canned cat food. There may be
operations are illustrated. It's surprising how
have in common, even though they process

5 After being graded in the filleting plant, the fish are lifted by power hoist and dumped onto the conveyor leading to the filleting line.



6 Working rapidly and skillfully with their knives, these men cut the fillets from the fish.

3 As the fish discharge from the scaler-washer, they fall into a big box. This box when full is lifted by a power hoist and dumped into an iced vat at the base of an elevating-type power-driven conveyor. The ice is to keep the fish from losing its prime quality while in process.

4 Mechanical fish "ladder," or elevating conveyor, carries the fish into the filleting plant.

PROCESSES

pares fish for the market and converts the
an idea here for you, since several unit
many things the different food industries
different types of products

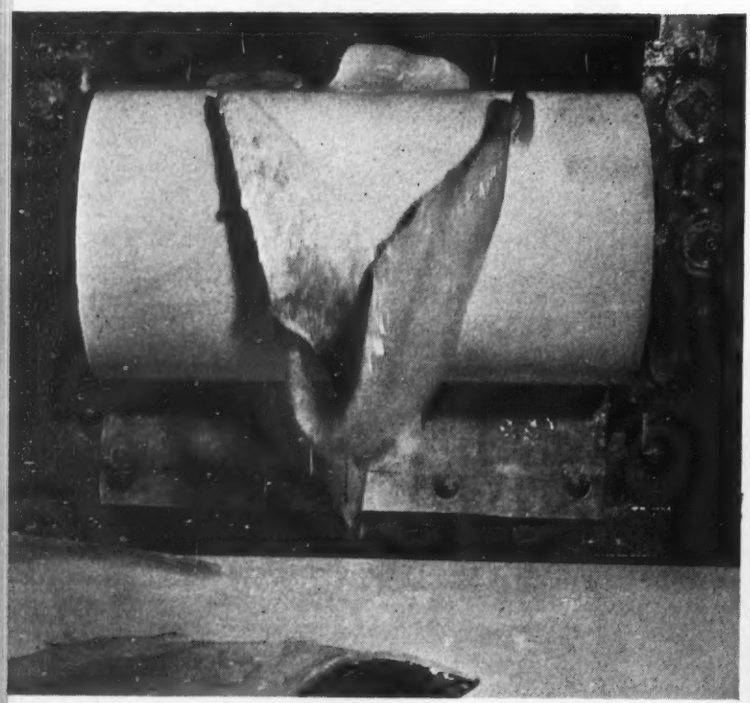
9 The weighed-out portions of fillets are wrapped in transparent cellulose and put into cartons.

7 Here are the fillets, as they are being lifted from their protective bath for delivery to the packing line.

8 Scaling the fillets into weight units for packaging.

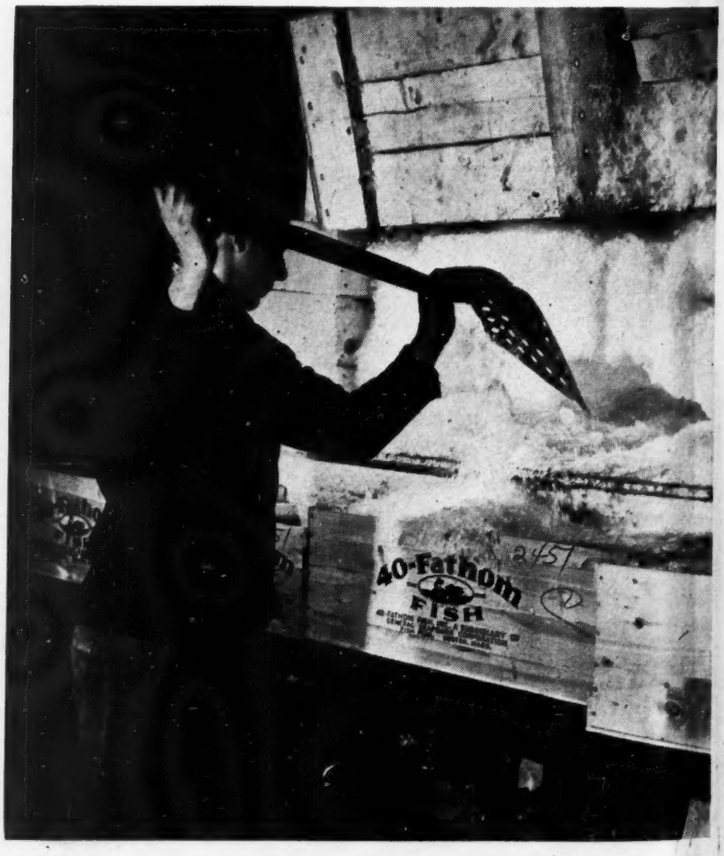
10 Packaged fillets stacked on a lift-truck platform ready to go to the quick freezer. After freezing the fish is held in a low-temperature storage room until distributed.

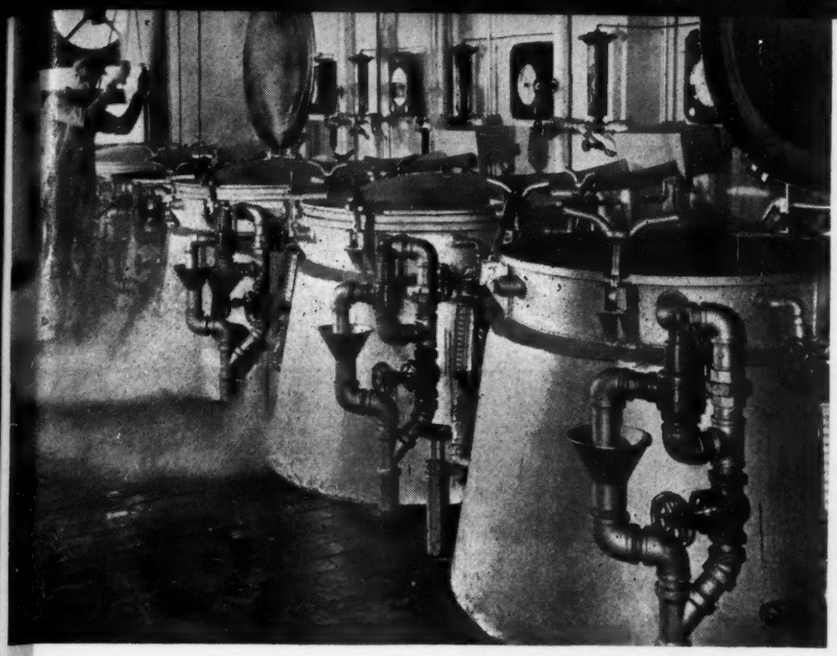
11 Large fish are being filleted here for the fish-market trade. Big pieces of boneless fish are obtained.



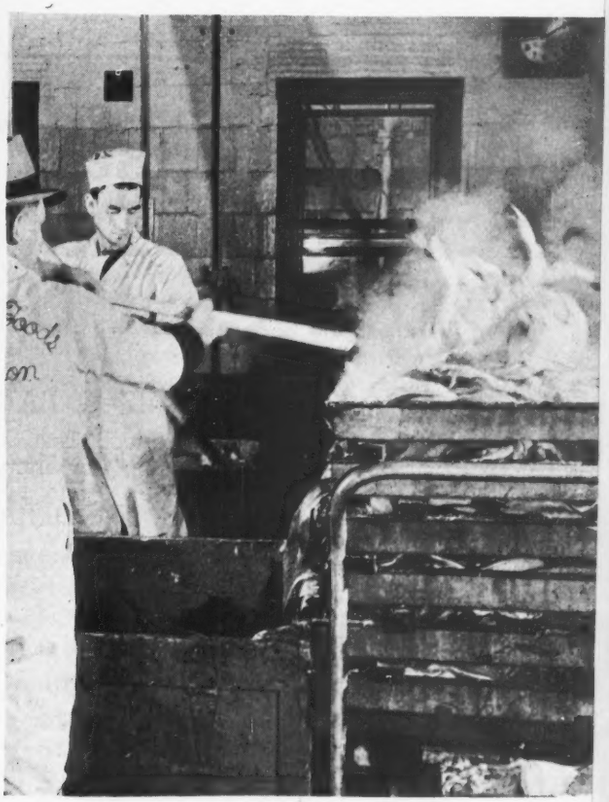
12 The heavy strips of waste-free fish roll off one conveyor onto another that takes them to the packing line. The conveyors are continuously washed with fresh water.

13 Big fillets are packed in wooden boxes with crushed ice for shipment in refrigerator cars to fish markets hundreds of miles away.

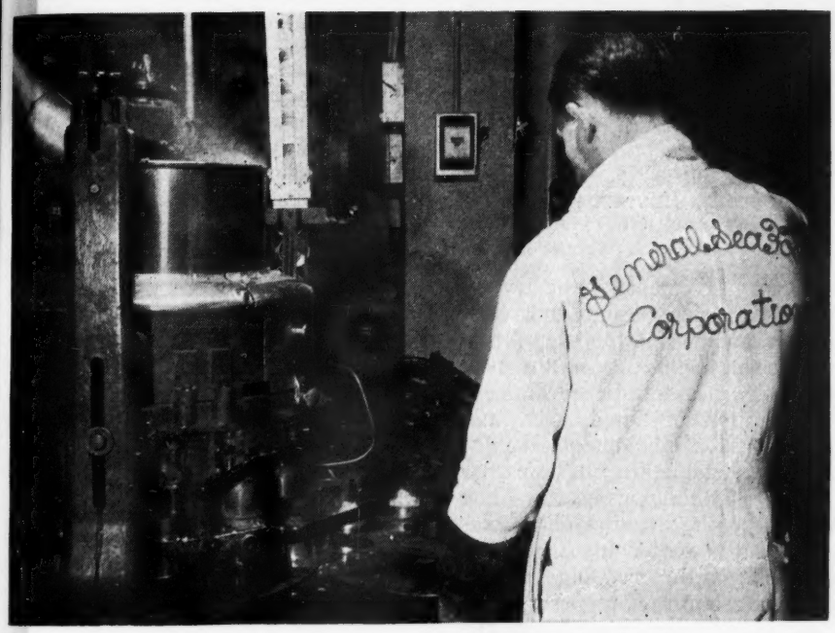




18 Pressure cookers, or retorts, in which the canned cat food receives its final processing. A power hoist lowers perforated steel baskets filled with the cans into the retorts and lifts them out after processing. The cans are then cooled, labeled, cartoned and shipped. Note pneumatic controllers (in background) which automatically regulate the temperature in the retorts.



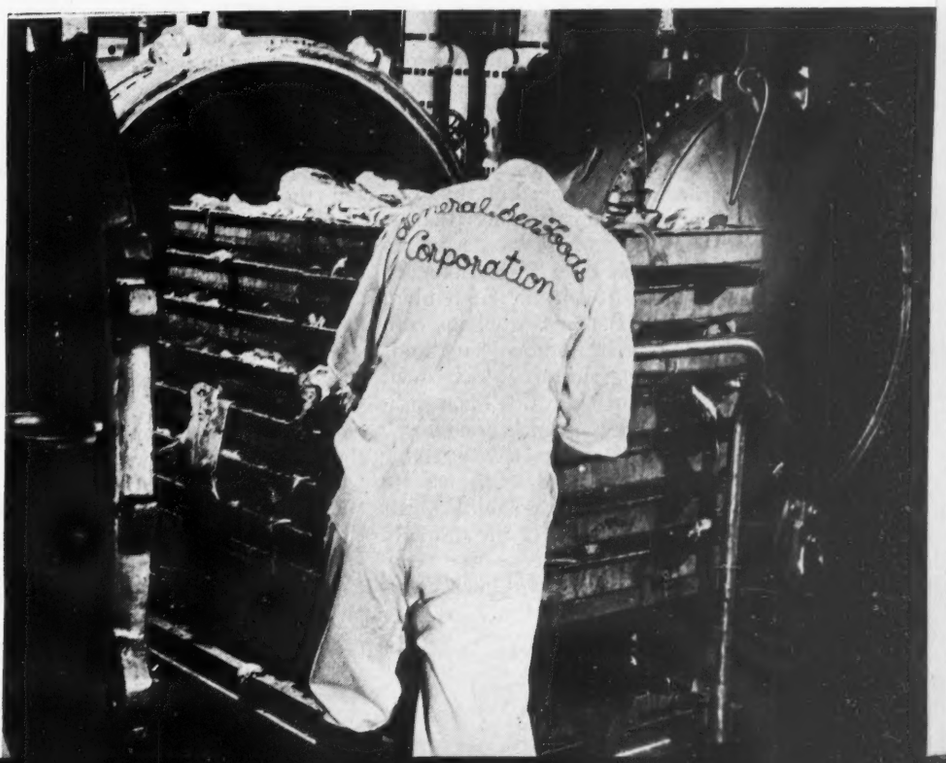
16 Hot out of the cooker, the steaming offal is transferred to a conveyor which takes it to the grinding and mixing operations.



17 The mixed cat food is here packed into cans.

15 The parts of the fish remaining after the filleting operation are not wasted, but are made into cat food. Trays of the offal are here being trucked into a big pressure cooker.

14 Wooden boxes of fillets are bound with wire and roll off the packing line ready for refrigerated transportation to market.



ENGINEERING

Efficient New Freezing Process and Machine Developed • Experimental Vinegar Generator

Polyphase Freezing Process Developed; Low-Cost Unit Built

By LUIS H. BARTLETT

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W. R. WOOLRICH

Dean of the College of Engineering, University of Texas

PART I—The South has a food preservation problem. And out of research to solve that problem comes not only a new low-price quick freezer but a new freezing process, the polyphase system. The process and the machine have a long list of advantages

FOR generations the southern and southwestern sections of the United States have produced twice as many perishable products as they could economically market. To solve this problem, engineering research investigators at the University of Texas set out to develop a low-priced, effective commercial freezer. And not only did they develop such a machine, but they discovered a new quick freezing process.

The University of Texas started its comprehensive program of food processing research at Austin in September, 1939. One of the first problems considered was that of improving methods of quick freezing shrimp, which is an important product of the Texas fisheries. The process which was developed embodies unexpected desirable features which have led to its use for quick freezing fruits, vegetables, meats and poultry, in addition to the seafoods. This system is known as the University of Texas Polyphase Quick Freezing System. It comprises the use of a new heat-transfer medium and novel designs of freezing machines.

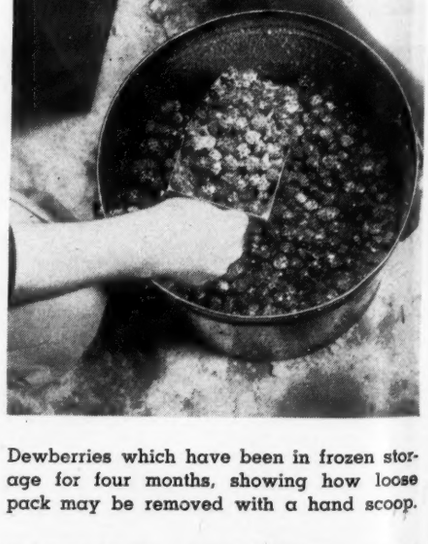
An outstanding feature of the new high-viscosity heat-transfer medium is its combination of liquid, solid and gaseous phases at the temperature of its most serviceable freezing capacity, hence the term "polyphase." The liquid phase is a viscous chilled solution having the desired freezing range. High viscosity at the operating temperature may be an intrinsic property of the solution or may be imparted by the addition of a suitable colloidal substance. Throughout this chilled solution is distributed the solid phase of the solvent in a finely subdivided form, and other solid phases may also be present. The gaseous phase may be solvent vapor, alone or in admixture with other suitable gases or vapors.

A typical example is an aqueous solution containing glucose and sucrose in the concentrations which produce the required freezing range and which also form a metastable solution at the operating and food storage temperatures. This solution is agitated and chilled until a finely subdivided ice phase is formed and distributed throughout the body of fluid. The high viscosity of the solution favors the formation of very small ice crystals and also permits very slow agitation to maintain them in uniform suspension. Some highly successful experimental freezing runs have been made with media of 10,000 centipoises viscosity at the operating temperature.

Immersion System

Articles of food are brought into direct contact with the polyphase medium, which is slowly agitated. This agitation moves the articles in respect to the fluid and also to each other. Heat is thus rapidly removed and the individual pieces are prevented from freezing together. The rate of freezing is so great that wash water or juice adhering to the food surfaces is frozen in place and does not dilute the polyphase medium. Constant observation of the concentration of the medium during prolonged freezing runs revealed that no dilution was occurring. While a quantity of washed dewberries was being packed, it was noticed that each frozen drupelet had an unusual pearly appearance. Examination proved that this was caused by a thin tightly adherent layer of ice. Dry berries frozen in the same manner do not acquire a similar coating.

The extraordinary rate of freezing is in part due to the prevention of supercooling of the food. Supercooling is the chilling of a liquid to a temperature below its true freezing point without the formation of any solid phase. This phenomenon may often occur in colloidal solution and is very marked in the case of food. Many foods do not begin to freeze even at temperatures considerably below their true freezing points. The polyphase medium pre-



Dewberries which have been in frozen storage for four months, showing how loose pack may be removed with a hand scoop.

vents supercooling by "seeding" or bringing numerous ice crystals into contact with the chilled food surface. Each ice particle is able to act as a nucleus or "seed" for the formation of ice in the food at the true freezing temperature, and thus actual freezing begins much sooner and at a considerably higher temperature than if the ice nuclei were not present in the fluid. The higher temperature of the food surface effects a larger differential across the fluid film and thus increases the rate of heat transfer during the initial stages of freezing. Furthermore, the early formation of the ice phase, which has a much greater thermal conductivity than the supercooled food, greatly reduces the total resistance to heat flow. It is probable also that the character of the fluid film is modified by the suspended ice crystals and its thermal resistance is likewise reduced. The conductivity of ice at 0 deg. F. is 1.3 B.t.u. per ft. hr. deg. F. while the conductivity of a 63 percent sirup at the same temperature is only 0.19 B.t.u. per ft. hr. deg. F.[1]

High Heat-Transfer Rate

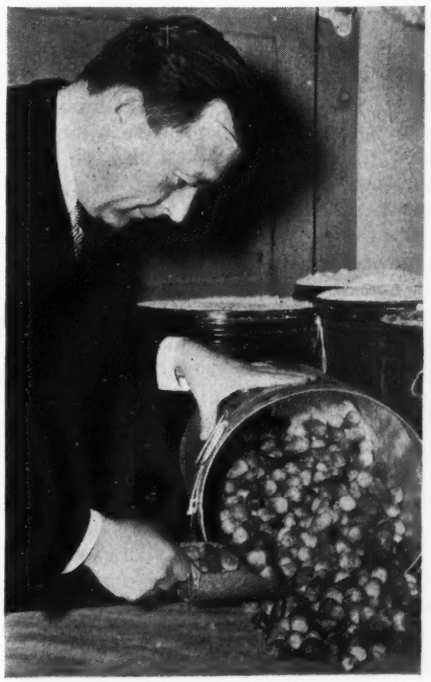
The very large thermal capacity of polyphase media, which may reach from two to five times that of liquid-phase media, allows the transfer of heat at high rates without correspondingly high fluid velocities.[2] Highly viscous fluids, particularly the concentrated sugar solutions, which have desirably low freezing ranges, may be circulated at rates which require negligible energy input, and yet very fast freezing may be secured. An important advantage of media which can be operated at subzero temperatures is that freezing is completed in one operation and no heat is removed in the storage room. The lower temperature of the polyphase medium again favorably influences heat transfer rates and adds still more speed to the freezing.

The freezing rates attained, under identical operating conditions, by means of a polyphase medium and a liquid phase medium are graphically compared in Figs. 1 and 2. Each point is the mean value of from three to five duplicate determinations. It may be noted that the polyphase medium removes a given quantity of heat approximately twice as fast as the liquid medium.

Experimental Technic

The following experimental technic was employed:

1. Fresh carrots were accurately cut into cubes. Portions of approximately 200 grams were transferred to a thermostat and brought to 77 deg. F.



Strawberries which have been in frozen storage for four months showing how the pack may be poured from the container.

2. The portions were weighed quickly and at once fed into the continuous freezer, which previously had been adjusted to an operating temperature of 1.5 deg. ± 0.5 deg. F. The polyphase medium was 56 percent invert sugar and contained approximately 5 percent of dispersed ice, while the liquid medium was a 59 percent invert sugar sirup and had an initial freezing point of 0 deg. F. In normal operation, more concentrated polyphase media and lower temperatures are employed, but for this series of tests the temperature was adjusted to the minimum at which a 59 percent sirup will function satisfactorily.

3. A series of carefully measured contact periods was secured by varying the speed of the machine. When the cubes emerged from the freezer tube, they were removed, quickly wiped with a dry towel, and transferred to a tared calorimeter which was then weighed to determine the amount of adherent medium.

The quantity of heat required to thaw and raise the temperature of the cubes to 77 deg. F. was ascertained and a correction for adhering medium was made.

5. Calculations: The net heat required to thaw and raise the temperature of the frozen food to 77 deg. F. was divided by the product of the freezing time and the weight. This value is expressed in B.t.u. per minute per pound of product and is the mean overall freezing rate for a particular cube size.

One sample from each run was split and the dephth of ice formation was visually observed. The removal of approximately 155 B.t.u. per pound resulted in ice formation throughout the cubes of carrot. No attempt was made to measure the interior temperatures, since a comparison between the respective heat-transfer rates was desired.

Food Drained After Freezing

After the desired chilling has been accomplished, the food is removed from the body of medium and allowed to drain in a refrigerated compartment. A very slow agitation during this step of the process facilitates the removal of adhering fluid. If desired, more vigorous means, such as an air blast, may assist the gravity draining. It is undesirable to completely remove the fluid since it serves as a very efficient protective envelope to prevent dehydration and oxidation and to preserve the full color and flavor of the food. The remaining film, which is supercooled and metastable, is now seeded with the stable phase in powder form and is thus caused to partially solidify. The resultant product, each piece of which

Table I—Grading of Foods Served at ASRE Food Conference Dinner.

(Held at Texas Union, University of Texas, Austin, March 13, 1941.)

Food	Inferior flavor	Normal flavor	Superior flavor	Score (percentage)
Marsh pink grapefruit section (f)	19	12	3	44
Marsh white grapefruit section (f)	5	22	8	86
Peeled Ramsey fig (f)	2	9	24	94
Bartlett pear (f)	4½	12½	17	87
Elberta peach (f)	2	15½	16½	94
Oxtail soup	2¼	14½	18	93
Broiled pork tenderloin (f)	2	6	24	94 [1]
Candied sweet potato	5	17	11	85 [2]
Steamed asparagus (f)	13	11	8	59 [2]
Steamed snap beans (f)	5	11	17	85 [2]
Lettuce salad	5	19	6	83
Coffee	2	12	13	93
Apple pie filling (f)	1	16	15	97
Maraschino cherry	4	0	0	0
Ice cream	0	13	17	100

(f) Indicates food frozen by The University of Texas Polyphase Quick Freezing System using water-sugar medium.

[1]This was the most appreciated item; four diners perceived sweetness, of which two indicated that this enhanced flavor. Note the preponderance of superior flavor votes.

[2]Two score cards graded asparagus and snap beans too sweet, of which one also graded sweet potato as oversweet.

Note: Fractions indicate two grades for one item. Score was calculated by adding normal and superior flavor votes, dividing by the total votes and expressing as percentage.

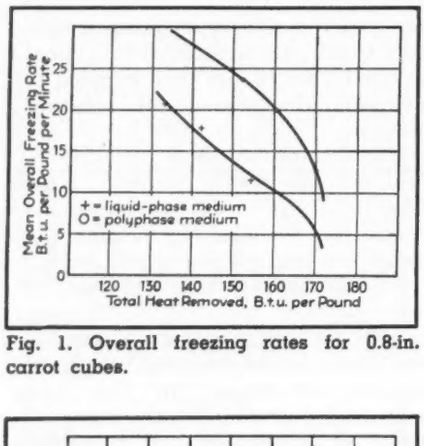


Fig. 1. Overall freezing rates for 0.8-in. carrot cubes.

Fig. 2. Overall freezing rates for 1.0-in. carrot cubes.

is covered with a tightly adhering solid or semisolid protective coating, may then be packaged.

Characteristics of Product

Foods which are chilled in one operation to the subsequent storage temperature before packaging do not later freeze together, but remain permanently loose. Containers of dewberries and strawberries which are loose after four months' storage are shown in accompanying illustrations. This permits storing and shipping to distribution centers in large containers, with economies in both space and transportation. The product may be repacked, without the necessity of thawing, into such packages as local trade requirements dictate. The institutional trade may purchase the large container and remove the desired quantity without difficulty or waste. Preparation of the loose pack for eating requires less time, since it may be defrosted in only a fraction of the time required for the solid pack. Diehl, Wiegand and Berry recommend quick defrosting to conserve the quality of frozen foods.[3] A more natural and appetizing appearance is presented by the loose pack and thus a stronger sales appeal is created.[4]

The film of polyphase medium which coats each piece of frozen food remains in place after formation of the stable phases has been accomplishd by seeding. Components of the medium may be chosen and proportioned so that the entire coating solidifies, but usually a slight excess of one solute will produce a film which does not flow. Sugar markedly retards oxidation and inhibits enzyme action, according to Tressler and Evers.[5] In addition to this protection, the tightly adhering envelope of stable polyphase medium prevents dehydration of the product. Sliced Elberta peaches have been successfully stored at 0 deg. F. for more than 12 months in unlined ice cream cartons of cold paraffined paper. Dressed poultry, frozen and protected by this medium, has been stored unwrapped without developing "freezer burn" or "pock marking" in 30 days.

The diffusion of soluble food constituents is largely avoided by the extreme freezing speed. No unnecessary colloidal changes of an irreversible nature are produced since the product is not at any time exposed to temperatures appreciably lower than that of the storage room. After defrosting, some foods are indistinguishable from the unfrozen product.

Palatability Determined

The protective effect of sugar or sirup coatings upon foodstuffs has led to investigation of the palatability of vegetables, meat and poultry which have been frozen in the water-sugar polyphase media. This innovation may seem startling, but when it is borne in mind that nearly all foods contain sugar and that sugar is added in the preparation of many dishes which are not considered sweet, the logic becomes apparent. Asparagus, avocadoes, broccoli, lima beans, snap beans, carrots, green peas, black eyed peas, pork, beef, veal and chicken have been frozen in the polyphase water-sugar medium.

The consensus of opinion is that all items tested are satisfactory and that some are definitely improved in flavor by the coating. Many tests have been made. At a dinner served to the ASRE Food Conference group at the Univer-

(*Turn to page* 103)

Experimental Generator Helps to Control Vinegar Manufacture

By F. M. HILDEBRANDT

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Laboratory-size apparatus gives experimental results that can seldom be duplicated in the plant. So it is often difficult to develop methods of controlling production except by cut-and-try. To get around this, U. S. Industrial Chemicals, Inc., developed this experimental vinegar generator

IN conducting operations on a large scale it is always a problem to devise control methods as a basis for regulation of the plant. Such control methods have to be convenient, they must be capable of giving the answer to questions in a reasonably short time and, perhaps the most important requirement, the small test should reflect accurately the behavior of the larger operation. The last factor frequently comes into question when any attempt is made in the laboratory to institute a test for plant control. The laboratory technician stands by his test as a true picture, while the plant operator usually asserts that what applies to the small test does not apply to the large operation. Both points of view are correct, in part.

The so-called quick vinegar process for the production of acetic acid is operated very largely by empirical methods. As far as the writer is aware there is no adequate technic for making small-scale tests by this procedure. The purpose of this article is to describe a

piece of laboratory apparatus by means of which vinegar can be produced according to the quick vinegar method. The apparatus is readily set up, easy to operate, and by its use results are obtained which may be applied to large scale operations in full size generators. The first part of the article to follow will be a description of the apparatus used and subsequently there will be given some typical runs made on this apparatus. It is felt that the work here reported fills a need in the vinegar manufacturing process for a means of duplicating on a small scale and in an experimental fashion the process which takes place in the large vinegar generators.

The Experimental Generator

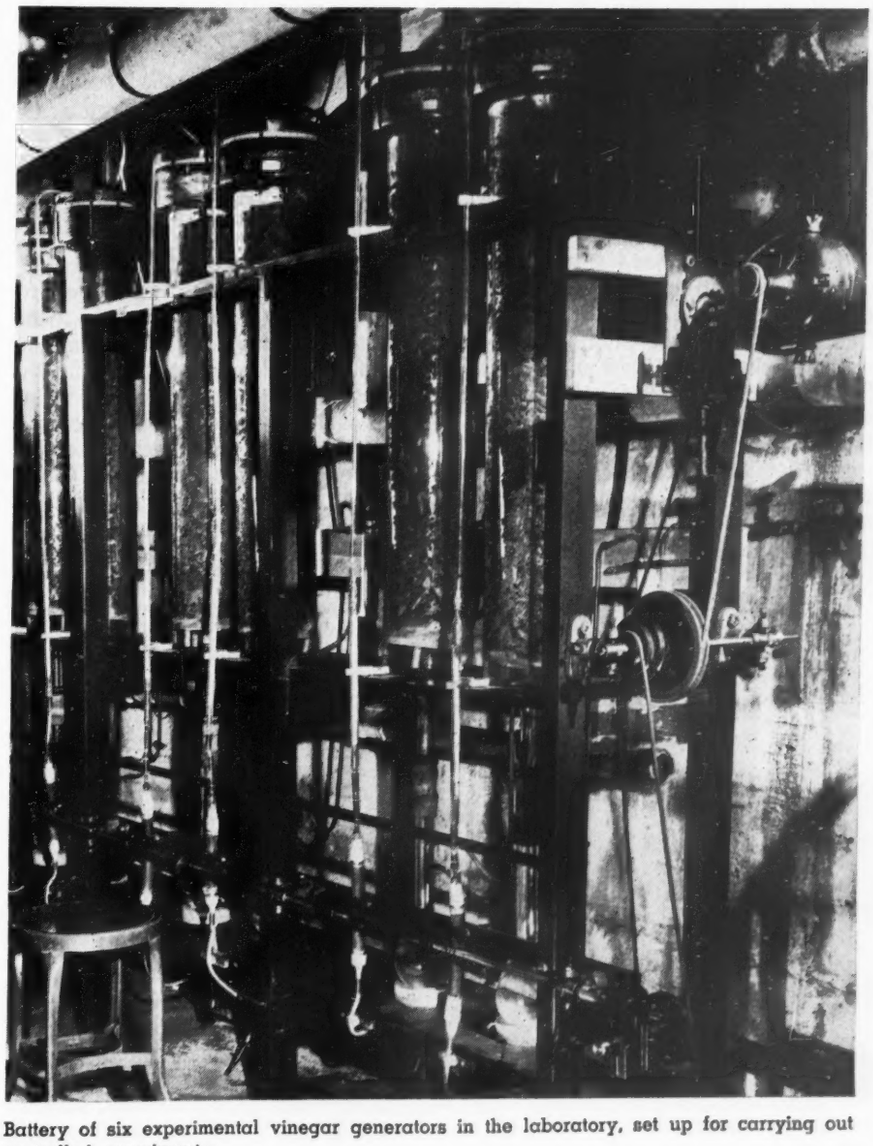
The general construction of this apparatus involves no new principles so far as its fundamental design is concerned. It consists of a vessel packed with beechwood shavings on which the vinegar organisms are growing in the usual way. Devices are included for circulating an alcoholic feed over these shavings continuously. Air is introduced into the lower part of the generator and the vapors escape from the top through a condensing system which has the purpose of reducing losses to a minimum.

Circulation of the alcoholic feed during the time of oxidation to acetic acid is accomplished by means of a special cam-driven pump that will be described presently. The air is measured by means of a flowmeter. The upper part of the generator, with the exception of the vent, is completely gas-tight. Suitable distribution of the feed is brought about by a perforated wooden disk in the top of the generator vessel and at the bottom of the vessel a similar perforated disk serves to hold the chips in place and to keep the mass of chips off the bottom of the generator.

Reference to the drawing and photograph will bring out details of the generator described above in a general way. The body of the apparatus consists of a piece of Pyrex industrial glass piping 6 in. in diameter and 40 in. long. This is the bell and spigot type of pipe. The pipe is mounted with the bell uppermost. The lower end of the pipe is drawn down to a tube about 1 in. in diameter. As will be seen from the drawing, the upper portion of the assembly is made gas tight by clamping a wooden block over the bell end. The ground surface with which these pipes are provided facilitates making the joint airtight. A rubber gasket is placed under the block. An ordinary glass condenser, as indicated by (1) in the drawing, serves to condense at least part of the vapors which might otherwise escape, carrying traces of the vinegar. The wooden block for closing is shown in (2), the rubber gasket at (3). In the case of the generator here described, beechwood chips were used for packing and these are indicated at (5) on the drawing.

The false bottom which holds the shavings in place is shown at (6). At (7) is the connection to a lower reservoir (9) from which the circulating material moves to the pump, thence back to the upper part of the generator. At (8) is shown the flowmeter assembly for measuring the air introduced into the generator. It may be noted that the reservoir is a large size Pyrex Kjeldahl flask adapted for this purpose by sealing in two tubes, one for the outlet at the bottom and one for the air in the neck, as is shown in the drawing.

Perhaps the most important part of the apparatus is the pump, which had to be designed especially for this work and which constitutes somewhat of a problem, since it must be acidproof and must deliver small quantities of circulating fluid continuously over long periods of time. The design finally adopted is a rather simple device which is operated by a cam shown at (12). The pump body consists of a piece of 1 in. (o.d.) by $\frac{1}{8}$ in. wall gum rubber tubing. Check valves are inserted into the top at (15) and into the bottom at (15a). The body of these check valves is made of glass and the valves are stainless steel balls. It is very easy to construct them, since the ball may be seated readily on the glass by touching the latter in a heated condition to the ball in order to make the two conform accurately.



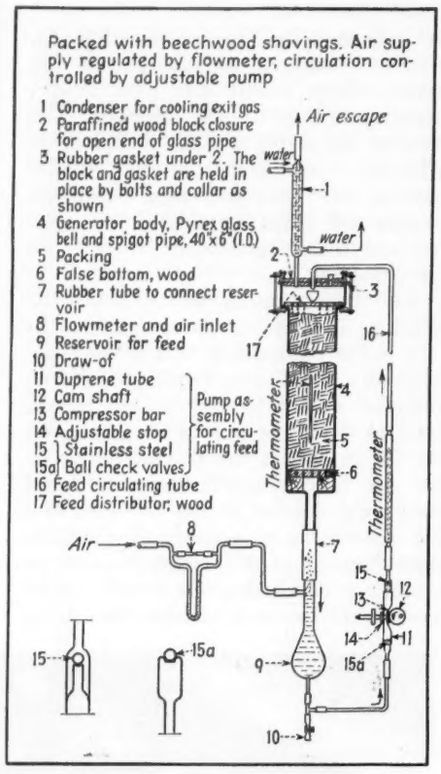
Battery of six experimental vinegar generators in the laboratory, set up for carrying out controlled experiments.

The pumping action is accomplished by compressing the tube. It will be seen that when the tube is compressed, liquid is forced up through check valve (15) and, when the pressure is released, fresh liquid passes into the pump through the check valve (15a). The actual compression of the tubing is accomplished by means of a compressor bar (13), which is in turn operated by the cam mentioned above. In order to regulate the amount of liquid circulated by the pump an adjustable stop (14) is placed behind the rubber tubing. This stop may be run in and out to regulate the amount of liquid pumped at each stroke.

The use of this pump has proved satisfactory over a considerable period of time. The gum rubber tubing resists the action of the vinegar quite well and the pump may be operated continuously for a period of about four months before it is necessary to renew the tubing. It will be seen that the essential factors of the vinegar process can thus be controlled. That is to say, the air may be regulated by means of the flowmeter and the rate of pour by means of the pump. The temperature is best taken care of by putting the entire generator in an incubator. Thermometers may be placed inside the body of the chips against the glass wall so that a reading can be made of the inside temperature of the generator. Also, a thermometer is provided in the discharge line from the pump, which is above check valve (15). Enclosed scale thermometers are best for this purpose since instruments with scales etched on the outside soon become illegible, because the alcohol-acetic acid solution removes the material used to fill the etching.

Operation of Generator

The operation of these generators is a relatively simple matter. A charge consisting of alcohol solution containing about 9 grams of alcohol per 100 cubic centimeters, with the necessary nutrients, is introduced into the generator. This may be done by running it in through the lower outlet (10) or by introducing it through the vent. The pump is then started and the charge circulated continuously over the chips. Air introduced through assembly (8) is regulated at the desired rate and the generator allowed to run until the alcohol in the charge has been oxidized completely to acetic acid. In the case of the generators here described this takes about one week. The volume of the charge used is around 2,000 c.c., which amount of liquid serves to fill the Kjeldahl flask and also extends up into the lower tube of the generator proper and under the false bottom shown in the drawing, but does not flood the lower part of the packing.


Packed with beechwood shavings. Air supply regulated by flowmeter; circulation controlled by adjustable pump
1 Condenser for cooling exit gas
2 Paraffined wood block closure for open end of glass pipe
3 Rubber gasket under 2. The block and gasket are held in place by bolts and collar as shown
4 Generator body, Pyrex glass bell and spigot pipe, 40"x6" (I.D.)
5 Packing
6 False bottom, wood
7 Rubber tube to connect reservoir
8 Flowmeter and air inlet
9 Reservoir for feed
10 Draw-off
11 Duprene tube
12 Cam shaft
13 Compressor bar
14 Adjustable stop
15 } Stainless steel
15a } Ball check valves
Pump assembly for circulating feed
16 Feed circulating tube
17 Feed distributor, wood
Air escape
water
water
Thermometer
Thermometer
Air
15
15a

Sketch of experimental vinegar generator, showing how it is constructed and course of ingredients during operation.

Six generators may be mounted in a rack, arranged so that any one generator can be removed for cleaning without disturbing the others. The generators have been operated as single units, that is, charges have been put into each unit and circulated until completely oxidized. It would be possible, however, by cross connections, to run from one generator to another as is done in many vinegar plants.

Once these experimental units have been set up and the pumps and air inlets entirely regulated, they will run with very little attention over long periods of time, it being necessary only to change the feed once a week and make the necessary titrations to determine the output of acid.

If a battery of generators is provided, a number of experimental variations of the ordinary process may be carried out, and one or more of the generators may be used as controls in order to determine the effect of these variations. It may be noted that the pumps of the entire battery are run by cams from a single shaft, driven through a reducing gear by a ¼-hp. motor. Suitable speed reduction is obtained by a worm gear reducer with a 48 to 1 reduction. If necessary, a jackshaft may be used also to reduce the speed further.

In these generators total volume of packing is 1,018 cu. in. The rate at which air is normally put in is 140 c.c. per minute and the charge is circulated at a rate of 2.6 c.c. per minute.

Results

Using the apparatus described above, a number of experiments have been carried out on these units. It has been found that very good yields may be obtained in normal operation; that the alcohol is completely oxidized and there is very little loss from the system. Tests have been made of nutrients, on the use of various types of feed and it is obviously possible to investigate many of the factors involved in the vinegar process quite readily with this experimental apparatus. It is also possible to use it as a plant control test if such control is desired in the vinegar operation. An experiment is shown in the table giving some of the results obtained with the apparatus over a period of months in which various types of alcohol were used for feed. These results are given by way of example to illustrate the operation of the units.

Comparison of Two Types of Alcohol as Vinegar Feed.

	Alcohol type A.					Alcohol type A with special treatments				
Run No.	Volume of draw-off c.c.	Alcohol in charge	Alcohol in draw-off	Acid in draw-off	Percent eff.	Volume of draw-off c.c.	Alcohol in charge	Alcohol in draw-off	Acid in draw-off	Percent eff.
1....	2,010	8.98	0.08	10.41	90.53	2,010	8.94	0.09	9.67	84.77
2....	2,000	8.98	0.17	10.34	90.28	2,030	8.94	0.22	9.83	88.05
3....	2,060	8.98	0.08	10.54	93.86	1,960	8.99	0.04	10.18	85.74
4....	1,990	8.95	0.08	10.57	91.20	2,020	8.99	0.15	10.31	90.63
5....	2,045	8.95	0.10	10.70	94.37	1,980	8.99	0.09	10.38	88.81
6....	2,020	9.02	0.42	10.18	91.48	1,980	8.99	0.14	10.51	90.42
7....	2,035	9.07	0.10	10.80	94.26	1,970	8.87	0.11	9.99	86.39
8....	1,960	8.77	0.14	10.14	88.55	1,980	8.87	0.45	9.60	86.78
9....	2,010	8.77	0.59	9.53	90.10	1,950	8.87	0.12	10.11	86.63
10....	2,020	8.87	0.11	10.26	91.01	2,000	8.87	0.12	10.17	89.41
Avg.	2,015	8.934	0.187	10.347	91.56	1,988	8.932	0.153	10.075	87.76

(1) Alcohol and acid figures in above table are expressed as grams per 100 c.c.

(2) 2,000 c.c. of acid-free solution made up with alcohol plus water plus malt extract used as charge for each run.

(3) The runs above represent ten days each.

(4) The efficiency is the ratio between the acetic acid actually produced and that expected on the basis of the chemical transformation of alcohol to acetic acid by oxidation. Each gram of input alcohol would produce 1.3 grams acetic by chemical oxidation. Thus total grams acetic divided by 1.3 (input alcohol minus residual alcohol) will give the efficiency.

What Do You Mean, pH?—Here's the Answer

By J. L. ST. JOHN

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If you are not a chemist and are covered with confusion when a quality control man tosses a "pH" your way, read this article. Then you will be able to toss it back next time. Not only is pH explained clearly, but values for foods are given. You don't need to be a Ph.D. to understand pH.

DOES not pH refer to acidity or alkalinity? Why, then, not simply titrate as was done in years past to determine the amount of acidity or alkalinity? Why call it "pH" and use fancy electrometric or colorimetric methods of determination?

What makes any material acid or alkaline? Let us look first at water—H_2O. Write it, instead, HOH or H-OH. This indicates that water may be considered to be composed of H, which stands for hydrogen, and OH, indicating oxygen and hydrogen together. When the H and OH separate in water and acquire an electric charge, they are called H and OH ions, or hydrogen and hydroxyl ions.

What has this to do with acidity and alkalinity? Just this: A substance which is acid contains a preponderance of hydrogen ions, while a substance which is alkaline or basic contains a preponderance of hydroxyl ions. It will be noted that all acids contain hydrogen, and in water solution hydrogen ions separate, giving the material its acid properties. Common acids include hydrochloric (muriatic), HCl, which separates into H^+ and Cl^-; sulphuric, $H_2SO_4 \longrightarrow H^+$, H^+ and SO_4^-; acetic, $H{\cdot}COOCH_3$ H^+ and $COOCH_3^-$. Common alkalis include sodium hydroxide (caustic soda), $NaOH \longrightarrow Na^+$ and OH^-, and ammonium hydroxide (ammonia water), $NH_4OH \longrightarrow NH_4^+$ and OH^-. The H^+ ion is common to materials which are acid, and the OH^- to materials which are alkaline.

If one adds a gram of hydrochloric acid to a liter of water, or a gram of acetic acid to a liter of water (or a pound to a gallon), the correctness of the total amount present may be determined by titration in the ordinary way. The same is true if one adds chemically equivalent amounts, which in these two cases would be 35.5 grams of hydrochloric acid per liter and 60 grams of acetic acid per liter, or 49 grams of sulphuric. These are chemically equivalent (equal) amounts; however, this does not necessarily mean that they have equal effects as an acid. In fact, the hydrochloric has a "stronger" acid effect than the acetic. While both the hydrochloric and the acetic molecules separate to form hydrogen ions, the two acids differ in the proportion of the total amount which splits up to form such hydrogen ions. A large part of the hydrochloric acid breaks up to form hydrogen ions, while a much smaller proportion of the acetic acid breaks up to form hydrogen ions. Therefore, there is a larger number of hydrogen ions in the hydrochloric acid solution than there is in the acetic acid solution, although the total amount of hydrochloric and of acetic in the two solutions is chemically the same. Since the hydrochloric acid solution contains a much larger number of hydrogen ions, it is therefore stronger or more active as an acid.

All a Matter of Ions

The term pH refers to the concentration of hydrogen ions—or, in the case of alkalis, hydroxyl ions—in a solution. Thus, methods for the determination of pH are designed to measure the concentration of hydrogen or hydroxyl ions in a solution, while the older method of titration measures the total quantity of the acid or the alkali, such as hydrochloric or acetic or sodium hydroxide, in a solution. Since it is the hydrogen or hydroxyl ion that gives the acid or alkaline properties to a solution, this measure of pH is a more accurate indication of its acid or alkaline properties.

It is possible to express the concentration of hydrogen ions or hydroxyl ions in terms of grams per liter (or in pounds per gallon). But as will be noted in the accompanying figure, this may involve large and unwieldy figures. Another method of expressing this concentration of the ions was developed years ago by Sorenson and is stated in terms of pH. The method by which this is calculated from the actual concentration need not be described here.

When a solution is neutral—neither acid nor alkaline—it contains equal quantities of hydrogen and hydroxyl

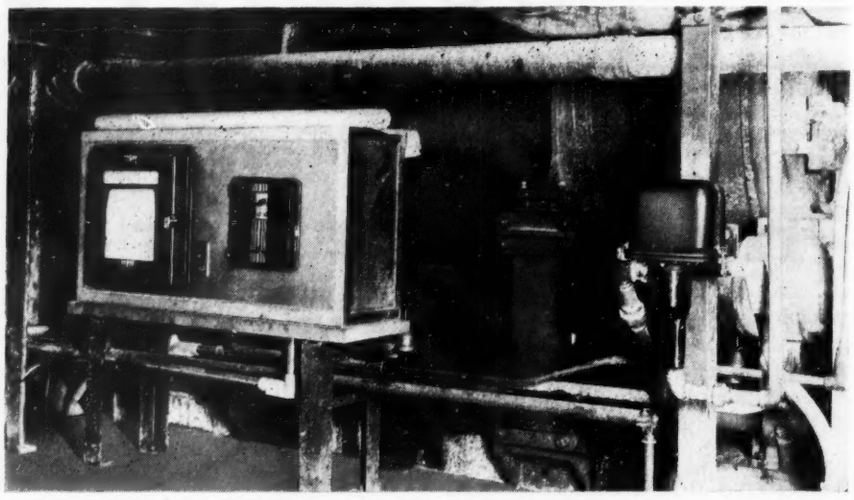
Slide comparator, or colorimeter, used for determining the pH of boiler water. It is made by W. A. Taylor & Co.

ions; that is, there is an excess of neither one. On the pH scale, this neutral point has a value of 7.0. Thus, pH 6.0 is more acid than pH 7.0, while pH 5.0 is still more acid. In this case, the lower the pH value, the higher the concentration of hydrogen ions.

On the alkaline side of the neutral point, pH 7.5 or pH 8.0 is more alkaline than 7.0, while pH 10.0 or 10.5 or 11.0 indicates still higher alkalinity, increasing progressively as the pH value increases, and showing a higher concentration of OH^- ions per liter of solution.

It should be pointed out that the term "pH" is used to express the relative active acidity or alkalinity of a solution when the concentration or quantity of hydrogen ions or hydroxyl ions present is comparatively small.

It should be emphasized that it is impossible to give an entirely adequate explanation of pH in nontechnical language and in a brief statement. The author here offers apologies to the physical chemist. Also, the numerals representing pH are not in direct arithmetical proportion to the relative hydrogen-ion concentration, since they are a logarithmic function. The concentrations of hydrogen ions represented by pH 3 and pH 4, for instance, do not indicate a ratio of concentration of 3 to 4. Actually, at pH 3 of the concentration of hydrogen ions is ten times the concentration at pH 4. Likewise, at pH 2 it is one hundred times that at pH 4. Similarly on the alkaline side, pH 11 represents a concentration of OH ions ten times that at pH 10, while a pH of 10 is one hundred times the concentration of pH 8.



pH recorder-controller in operation in a chemical plant. Made by Leeds & Northrup Co., it is of the antimony-electrode, electrometric type.

pH Values of Foods

Table I, which is built around a pH scale which covers a range from 0 to 14, contains, in addition to this scale, a statement of the concentration of hydrogen ions in terms of grams per liter of solution, and also a statement of the ratio of acidity or alkalinity to that of pure water. There is also included an indication of the pH value of several familiar materials. In addition, Table II lists the pH value of a number of acids and alkalis, and also a number of foods and other familiar substances. For instance, ordinary apple juice, which has a slightly sour taste, has a pH value of around 3.0 or 4.0, while ordinary vinegar is 2.4 to 3.4. Ordinary baking soda has a pH of about 8.4, while washing soda is much more alkaline and has a pH of 11.6. Saturated lime water is 12.3, while the strong alkali sodium hydroxide in rather dilute solution has a pH of 13.0. The reason why substances such as baking soda, alum, flour and fish, which are not commonly thought of as acids or alkalis, have a pH value will not be discussed here.

Table I—pH Comparisons and Values for Familiar Substances.

Grams of hydrogen ions per liter of solution	No. of times acidity or alkalinity exceeds that of pure water (pH 7.0)	pH		pH of familiar substances
	10,000,000	↑	0.	
1/10	1,000,000		1.0	0.1 N hydrochloric acid
1/100	100,000		2.0	Human gastric contents Vinegar 0.1 N acetic acid
1/1,000	10,000 (acidity)		3.0	Apple juice
1/10,000	1,000		4.0	Methyl orange changes color Grapes
1/100,000	100	Increasing acidity	5.0	Molasses 0.1 N boric acid Bread
1/1,000,000	10		6.0	Milk Flour Fish
1/10,000,000	1 (pure water)	Neutral	7.0	Pure water Human blood plasma Saliva
1/100,000,000	10		8.0	Baking soda Sea water
1/1,000,000,000	100		9.0	Phenolphthalein changes color
1/10,000,000,000	1,000		10.0	Soap Milk of magnesia
1/100,000,000,000	10,000 (alkalinity)	Increasing alkalinity	11.0	Washing soda Trisodium phosphate
1/1,000,000,000,000	100,000		12.0	Lime water
1/10,000,000,000,000	1,000,000		13.0	0.1 N Sodium hydroxide
	10,000,000	↓	14.0	

Strength vs. Concentration

To those familiar with the term "normality," indicated by N, as used in stating the concentration of hydrochloric acid or sodium hydroxide, it may be stated that a 0.1 N solution of hydrochloric acid, which is a strong acid, has very roughly a pH of 1.0. This apparent relation, however, is not true for a weak acid, such as acetic acid, since a 0.1 N solution of this acid has a pH of 2.89, while a 0.1 N solution of boric acid has a pH of 5.2. By titration these three acids show exactly the same concentration, but it is well known that there is a pronounced difference in the properties of solutions of these three acids. A solution of hydrochloric acid is corrosive, a solution of acetic is frequently a part of our diet as vinegar, whereas we may employ a boric acid solution as an eye wash. The intensity of acidity of these three acids, in equivalent concentrations, for example

0.1 N, will vary roughly in the ratios, 15,000:200:1. The acid intensity of the hydrochloric acid is therefore roughly 75 times that of acetic acid and 15,000 times that of boric acid. It is this difference in intensity of acidity that is determined by pH measurements. This difference between hydrochloric acid and acetic acid is due to the difference in the extent of the ionization of the two acids. The term pH is related only to the normality of hydrogen ions and therefore does not necessarily have a direct relation to the term nomality as ordinarily used to express the total concentration of standard acid and alkali solutions.

The above brings out the difference in meaning between the words "strength" and "concentration." It is evident from the discussion that two acid solutions, for instance, may be equal in concentration, although one may be much stronger than the other; that is, may have a higher concentration of hydrogen ions. Strength should not be used to mean concentration. One may have two concentrated acid solutions which are not of the same strength, or one may have two dilute solutions (not concentrated), one of which may be strong and the other weak. Hydrochloric and nitric acids are strong acids, while acetic and lactic acids are weak, even though they may all be present in solutions in equal total concentration.

Table II—pH Values of Various Acids, Bases and Common Substances

0.1 N Acids and Bases

Acids	pH Value	Bases	pH Value
Hydrochloric acid	1.0	Sodium bicarbonate	8.4
Sulphuric acid	1.2	Borax	9.2
Phosphoric acid	1.5	Ammonia	11.1
Sulphurous acid	1.5	Sodium carbonate	11.6
Acetic acid	2.9	Trisodium phosphate	12.0
Alum	3.2	Sodium metasilicate	12.2
Carbonic acid	3.8	Lime (saturated)	12.3
Boric acid	5.2	Sodium hydroxide	13.0

Common Substances

Apples	2.9–3.3	Magnesia, milk of	10.5
Apricots (dried)	3.6–4.0	Milk, cows	6.4–6.8
Asparagus	5.4–5.7	Molasses	5.0–5.4
Beans	5.0–6.0	Olives	3.6–3.8
Beers	4.0–5.0	Oranges	3.0–4.0
Beets	4.9–5.6	Peas	5.8–6.4
Blackberries	3.2–3.6	Peaches	3.4–3.6
Bread, white	5.0–6.0	Pears	3.6–4.0
Cabbage	5.2–5.4	Pickles, dill	3.2–3.5
Carrots	4.9–5.2	Pickles, sour	3.0–3.5
Cherries	3.2–4.1	Pimento	4.7–5.2
Cider	2.9–3.3	Plums	2.8–3.0
Corn	6.0–6.5	Pumpkin	4.8–5.2
Crackers	7.0–8.5	Raspberries	3.2–3.7
Dates	6.2–6.4	Rhubarb	3.1–3.2
Flour, wheat	6.0–6.5	Salmon	6.1–6.3
Ginger ale	2.0–4.0	Sauerkraut	3.4–3.6
Gooseberries	2.8–3.1	Shrimp	6.8–7.0
Grapefruit	3.0–3.3	Spinach	5.1–5.7
Grapes	3.5–4.5	Squash	5.0–5.3
Hominy (lye)	6.9–7.9	Strawberries	3.1–3.5
Human blood plasma	7.3–7.5	Sweet Potatoes	5.3–5.6
Human dulodenal cont.	4.8–8.2	Tomatoes	4.1–4.4
Human feces	4.6–8.4	Tuna	5.9–6.1
Human gastric cont	1.0–3.0	Turnips	5.2–5.5
Human milk	6.6–7.6	Vinegar	2.4–3.4
Human salvia	6.0–7.6	Water, distilled (equil. with air)	5.8
Human spina. fluid	7.3–7.5	Water, distilled (CO_2 free)	6.8–7.0
Human urine	4.8–8.4	Water, mineral	6.2–9.4
Jams, fruit	3.5–4.0	Water, sea	8.0–8.4
Jellies, fruit	3.0–3.5	Wines	2.8–3.8
Lemons	2.2–2.4		
Limes	1.8–2.0		

Buffer Action

One factor of importance in establishing or maintaining the pH of a material in solution is the fact that many or most products exert what is known as a "buffer action." Due to this, it is possible many times to add fairly large quantities of an acid or an alkali to a solution of a material, or, on the other hand, to dilute a solution, without effecting a very material change in the pH value. In other words, while the concentration of the acid or alkali may be changed to quite an extent, the concentration of the hydrogen ions is affected to a very small extent. This may be illustrated as follows: Pure water has a pH value of 7.0. Adding one milliliter of 0.01 N HCl to a liter of pure water changes the pH to approximately 5.0, since there is no buffer present to retard the effect of the added acid. However, if the same quantity of hydrochloric is added to a solution containing both sodium acetate and acetic acid, for example, the change in pH value is very small. The sodium acetate and the acetic acid have repressed the splitting of the hydrochloric acid into hydrogen and chlorine ions or, in other words, they act as buffers. The hydrochloric acid has combined with the sodium acetate to form acetic acid, and the concentration of the latter has been slightly increased. Since, as discussed above, acetic acid is a comparatively weak acid, that is, only a small part of it dissociates to produce hydrogen ions, the final result of the addition of the hydrochloric acid is a small increase in the concentration of hydrogen ions, rather than a large increase as was brought about when hydrochloric acid alone was added to the pure water.

Many other materials act as buffers, including phosphates and borates, and various such materials exert buffer action over different parts of the pH scale. Buffer action may have great practical importance. If it is desired to standardize an industrial process within a narrow pH range, the addition of suitable buffers may accomplish this in a practical way.

Since pH is a measure of the active or effective acidity in a solution, it is more directly related many times to chemical or biological phenomena than the total amount of acid or alkali present. For instance, it is more directly related to the effect of acids in the curdling of milk (casein manufacture) and to the action or speed of action of enzymes, to the growth of bacteria or to the bactericidal effects of washing powder or other antiseptics and to many other processes.

However, a determination of pH cannot take the place of a determination of the total acidity by titration in determining the quantity of neutralizer to be added in neutralizing cream, although it is a valuable criterion of the extent to which cream has actually been neutralized. The determination of pH has many valuable applications in industry. Operating conditions can be more exactly duplicated through pH control. It has been utilized in many manufacturing processes, including sugar manufacture, electroplating, paper manufacture, agricultural industries and bacteriological manufacturing processes.

Ways To Measure pH

In general, there are two methods for the determination of the pH value of a solution—the colorimetric and the electrometric. Common indicators change color at different pH levels; for instance, phenolphthalein, which is commonly used in titration, changes color at a pH of about 9.0, while methyl orange changes at about 4.0. Since indicators have a different color with differing pH values, by adding a measured amount of an indicator to a series of solutions of different pH value, standards can be established which have a definite color at each pH level. And when the same amount of indicator is added to an unknown solution, a comparison of the color with the standard will establish the pH value of the unknown. By using a number of different indicators and making up such standards, a colorimetric set can be prepared which will cover the entire range of pH values from 0 to nearly 14. Sets of such indicators are made up by certain commercial companies, and together with the necessary equipment and indicator solutions, are manufactured and sold in sets for the convenience of commercial plants in measuring and controlling the pH in manufacturing processes. Naturally, such colorimetric procedures can be used only with colorless solutions, or at best, slightly colored solutions which would need to be standardized before using. Also, many turbid solutions would offer difficulty in using the colorimetric procedure, as would also solu-

(Turn to page 103)

OPM Tests Cheap Box For Lease-Lend Food

May be answer to urgent war-time need and also important long-time development. Tight wrapper of treated kraft paper makes corrugated cartons moisture-resistant and durable, giving low-cost export container

OUT of the urgent needs of the war are developing some new methods of packaging foods in shipping containers that will have long-time as well as immediate benefits. First came the new FSC Types A-1, A-2 and A-3 solid fiber containers, designed to withstand not only dampness but actual immersion in water for definite periods of time. Fibers meeting the Type A specifications will not soak up more than 50 percent of water in 2½ hours, fray out or become mushy. The trick is the use of special methods of sizing the paper of which the board is made, plus the use of starch adhesives instead of alkaline adhesives whose alkalinity impairs the water-repelling property of the rosin-alum sizing.

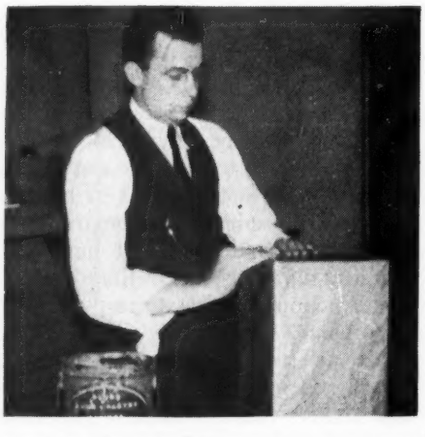
Shortage Developed

The inability on the part of manufacturers of solid fiber containers to turn out the new Type A material as rapidly as needed for Lease-Lend food shipments in the summer and fall of 1941 led to the temporary waiving of a Type A specification which, admittedly an expedient, was far from satisfactory for meeting the huge demands for food for Britain. There were times when ordinary corrugated containers had to be used in large numbers in order that the food could be delivered on time to ships scheduled to sail in convoy. Corrugated boxes that had to be strapped with steel were not waterproof, and often arrived at their destination in England in a sodden condition that required repacking, if, indeed, the containers had not completely disintegrated.

Conditions Severe

Among the conditions to be met in Lease-Lend shipping are dampness aboard ship, possible damage to the cargo by water in case of torpedoing without sinking the ship, unloading the ship in England in the rain, deposit on uncovered docks or even on wet ground and transport storage in dampness or even in rain. It is said that every food shipment to Britain is almost sure to get at least one drenching.

Here is a view showing the position of the corrugated box on the water-resistant paper when diagonal style wrapping is used



This is how the shipping container looks after the wrapper has been applied. It is now ready for shipment.

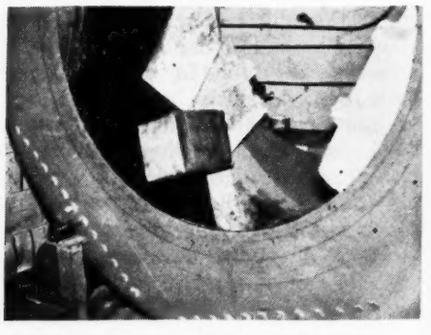
Type A Boxes Expensive

While Type A fiber containers are technically satisfactory, their cost is nearly double that of a corrugated case of the same size. Representatives of OPM and FSCC have been experimenting with a paper wrap for ordinary corrugated cases that may offer the same service as Type A fiber yet will cost roughly the same as a strapped corrugated box. Tight-wrapping the corrugated case with a suitable paper of a water-resistant character appears to contribute moisture-proofness and eliminate the need of strapping for export.

Recent tests at the Container Testing Laboratories of the latest development, in the presence of representatives of OPM and FSCC, appear to warrant a trial overseas shipment in this new form of package. In several of the tests the containers were sprayed with water for an hour before being tumbled in the drum. The tight-wrapped paper cartons held up exceptionally well in these rigorous tests.

Big Saving Possible

Estimates indicate that the work of OPM to develop the new container may save Uncle Sam about $300,000 per month on the cost of Lease-Lend for shipments to Britain.



A filled corrugated container is tested in a tumbling drum. A counter records the number of drops it takes to tear out one edge or to make the box unusable.

Shorts on Shortages

You are not alone in your troubles growing out of the defense program, as the items on this page will testify. And you will find it interesting to see what others are up against. Perhaps you also will get some ideas that will stand you in good stead.

WITH problems of procurement and discovery of possible substitutes growing more difficult every day, FOOD INDUSTRIES is reporting from time to time on shortages that exist or may be anticipated. The first installment appeared in September. The fourth follows.

You are invited to contribute your own ideas or experiences to this department. Simply mail them to the editor.

Shipping Container Situation Complex

FROM a condition of delayed deliveries of both corrugated and solid fiber containers in the summer and early autumn, some manufacturers of these containers are now actively seeking business. What recently seemed like a container shortage has reversed itself temporarily, FOOD INDUSTRIES has been advised. With the advent of spring and the production of seasonal crops, the demand again is likely to exceed the supply greatly.

To explain the past situation is not easy with the amount of information available. Food to Britain requires a fairly steady flow of ten to fifteen million containers per month, which will use about 200,000 tons of paper board per year. Shell containers (a new form of package for artillery shells) will require a like amount of paper. But neither of the foregoing will account for the difficulties of the past half-year. Nor will the quartermaster purchases explain the situation.

The best explanation seems to be that there has been a huge increase in every demand for paper containers and, in particular, for paper itself, not merely an increase in a few specific directions. Exported paper containers obviously are lost to the U. S. economy. Hence, until salvage, recovery and remanufacture of waste paper in all forms is vastly increased in the U. S., the shortage of paper and pulp is likely to be reflected in difficulties of procurement of paper containers.

What should be the buying policy for future needs? At the moment there seems to be an apparent temporary relief from delayed shipments. Additional container plants have come into production, but there is no comparable increase in paper pulp production. On November 2 the Interstate Commerce Commission relaxed its rules on paper containers, permitting the use of material about 10 percent lighter than the previously required weight. This one move is expected to save about 300,000 tons of paper board per year. Many trade associations have been asked by OPM to induce their members to reduce their uses of paper in packaging and are endeavoring to comply. At the moment the important indefinite elements in the situation appear to be: (1) The possible adoption of the less expensive paper-wrapped corrugated paper case as the alternative to the FSC Type A containers for Lease-Lend food exports (experimental tests of this container are described elsewhere in this issue); (2) the date of the heavy pick up in spring demand for containers. From present indications it would appear to be sound policy to take advantage of the current apparent let up in demand and lay in the necessary supplies of containers. But this is not a recommendation to hoard.

To hoard is to invite extension of priorities or allocations to this commodity. OPM is hoping that no priority restrictions will be necessary but is getting ready to apply them if the need arises. The safe rule is: Buy reasonably.

Ship Shortage To Curtail Imports

LACK of sufficient shipping space for importation of many supplies is likely to have a noticeable effect on many a food industry in 1942 and 1943. Whether the decreased importations will result in merely higher prices, rationing of certain items or actual shortages remains to be seen. Outcome of the Battle of the Atlantic and what Japan decides to do, plus John L. Lewis' coal strikes, jurisdictional strikes and other outrages in the shipbuilding industry are factors to be considered.

It is entirely possible that shipments of sugar from Hawaii and the Philippines may be greatly reduced in the future. The U. S. Department of Agriculture is concerned over the outlook. Smart manufacturers are considering the possibility of formula revisions to use greater amounts of dextrose. A few years ago one manufacturer of dextrose hinted that some day he would be able to supply levulose made from dextrose. Perhaps his research in this direction may come into practical fruition in the near future under the stimulus of higher prices. Certainly it would be most opportune.

Imported spices, flavors, herbs, tapioca, cocoa, tea and coffee are subject to the same shipping problems as sugar, rubber and tin. In view of the impending possibilities it is important that management consider either formula revision or development of new products that can be made from domestic materials and successfully sold. The advantage of the latter plan is that older products that have earned a high consumer acceptance will not be altered. The disadvantage is the cost of promoting a new product. In either case the choice is not easy.

Steel Paradox

ABOUT 1,000,000 tons of merchant ships will be launched in 1941. The shipbuilding program for 1942, however, calls for 6,000,000 tons. Yet despite this six-fold increase in construction, no more steel will be required for it in 1942 than was delivered to the shipyards in 1941.

To explain this paradox it is necessary to realize that behind each ship on the ways in 1941 there is enough steel in stock in the yards to construct about five more ships. This amount of steel, plus that which was needed to construct new shipways, plus the steel that went into the ships built in 1941, has created the maximum burden of this particular demand. Unless new shipyards are built, the call for steel going to this use will be materially less. In a way, the situation is comparable to materials in process in food and chemical plants.

No Shortages Here

A WISECRACK from an important member of OPM deserves repetition here for it indicates the sort of problems ahead for every one. Said he:

"In 1942 the only things that will not be short will be lumber, water and air."

Folks who live in the 1941 eastern drought area are not so certain, however, about the freedom from a water shortage.

Below-Zero Truck Has Handy Compartments

Combines new type of refrigerating unit with special body which can be mounted on conventional chassis. Body consists of two rows of cylindrical compartments opening on top and separated by catwalk

DESIGNED to do a good job of delivering frozen foods from local wholesalers to consumers, the unit shown on these pages combines a new kind of refrigerating unit with a motor truck body of radical design.

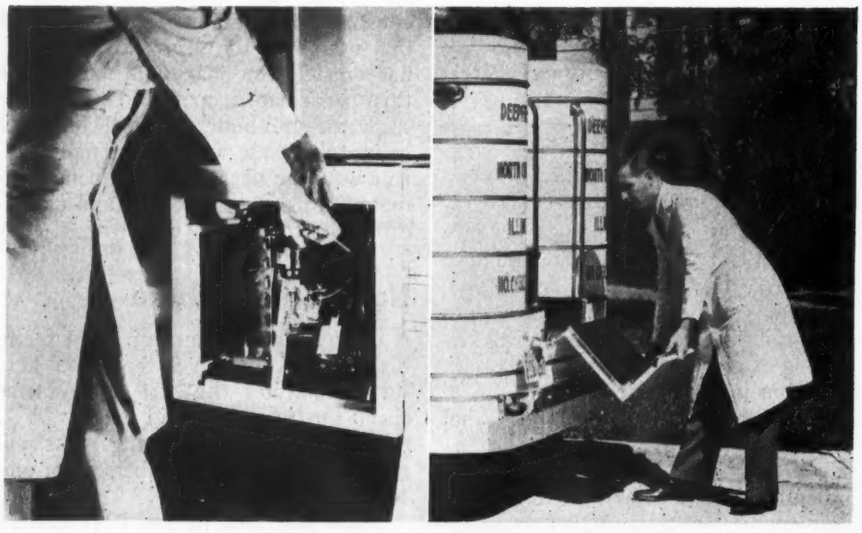
With the rapid increase in sale and consumption of all types of frozen food products, wholesalers of such goods have had to rely upon the use of makeshift types of bodies and refrigeration means not providing zero temperatures. A body designed especially for the purpose and the maintenance of zero temperatures are combined in the new delivery unit here pictured and described.

The new refrigeration means is the "Deepfreeze" unit employing Freon as a refrigerant It is made by the Deepfreeze Division of the Motor Products Corp. of Chicago. From eight to ten of these Deepfreeze units are utilized in each of two standardized body types of unusual design made by the Henney Motor Co., of Freeport, Ill., and suitable for mounting on conventional and cab-over-engine chassis of several of the popular motor truck makes.

The most unusual thing about the new truck body is that it has no roof. Instead of the conventional panel or box-like body with roof, sides and ends, the new Henney Deepfreeze body has two specially constructed sections of food compartments, mounted one on each side of the chassis with an open catwalk between.

As shown in the accompanying illustrations, each of the food compartments

One of the new Henney Motor Co.'s standardized 36-cu. ft. frozen food delivery trucks. This one, mounted on a Ford chassis, is used in North Chicago, Lake Forest and other North Shore communities.



LEFT, how access is had to the Freon compressor unit. RIGHT, how the step used by the salesman to get from the catwalk to the street in making deliveries is folded up to prevent "hitchers" from climbing into the catwalk while the truck is in transit.

is made up of four or five of the Deepfreeze cylindrical units, each with its own individual cover. And over these units is a lengthwise metal cover hinged at the outer side and opened upward by the driver-salesman while he is standing on the catwalk.

These overall hinged covers protect the Deepfreeze units from rain or snow to practically the same extent as if the units were enclosed in a conventional type panel body.

Body Does Not Retain Heat

The catwalk type of body has the advantages of being new and unusual, does not tend to retain heat as does the regulation panel body, is lighter in weight and has better driver vision for backing up or parking in restricted areas.

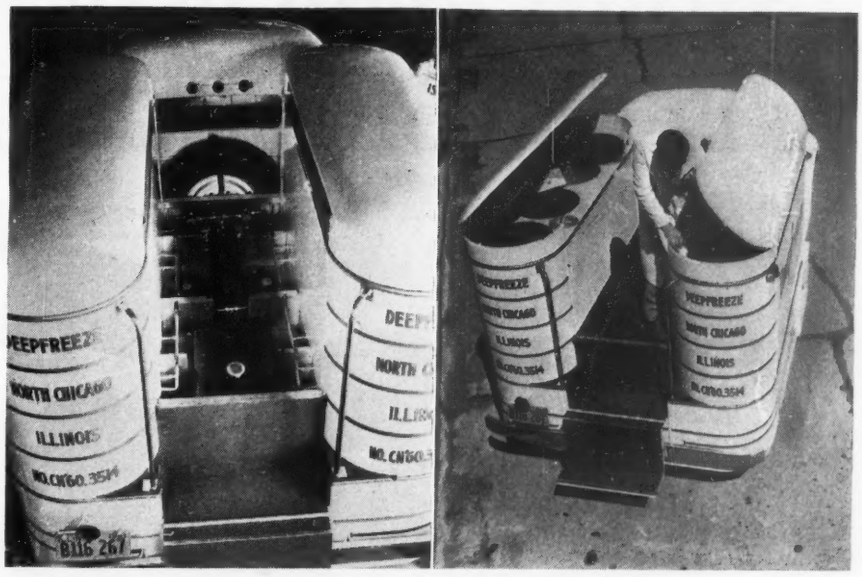
The Henney Co. is offering two standardized types of bodies to the

frozen food distributor. One has a payload of 36-cu. ft. and the other, 77-cu. ft. The former can be mounted, ready to operate, on any make of chassis with a frame length of 88½ in. behind the cab. Neither Henney body is sold separately. Each is custom built on the specific chassis selected.

Zero to 30 Deg. Below

The Deepfreeze unit employed as a refrigerating means was invented by Willard L. Morrison, president of Motor Products Corp. It carries the frozen foods at controlled temperatures of from 0 to minus 30 deg. F.

As shown in the accompanying illustrations, the Deepfreeze unit consists of two concentric cylindrical walls, the outer adequately insulated, mounted on an insulated base at the bottom, with a cover at the top. The space between the inner and outer walls is ⅛ in. Because the inner and outer cylinders are round, they do not have to be welded together to withstand pressure.



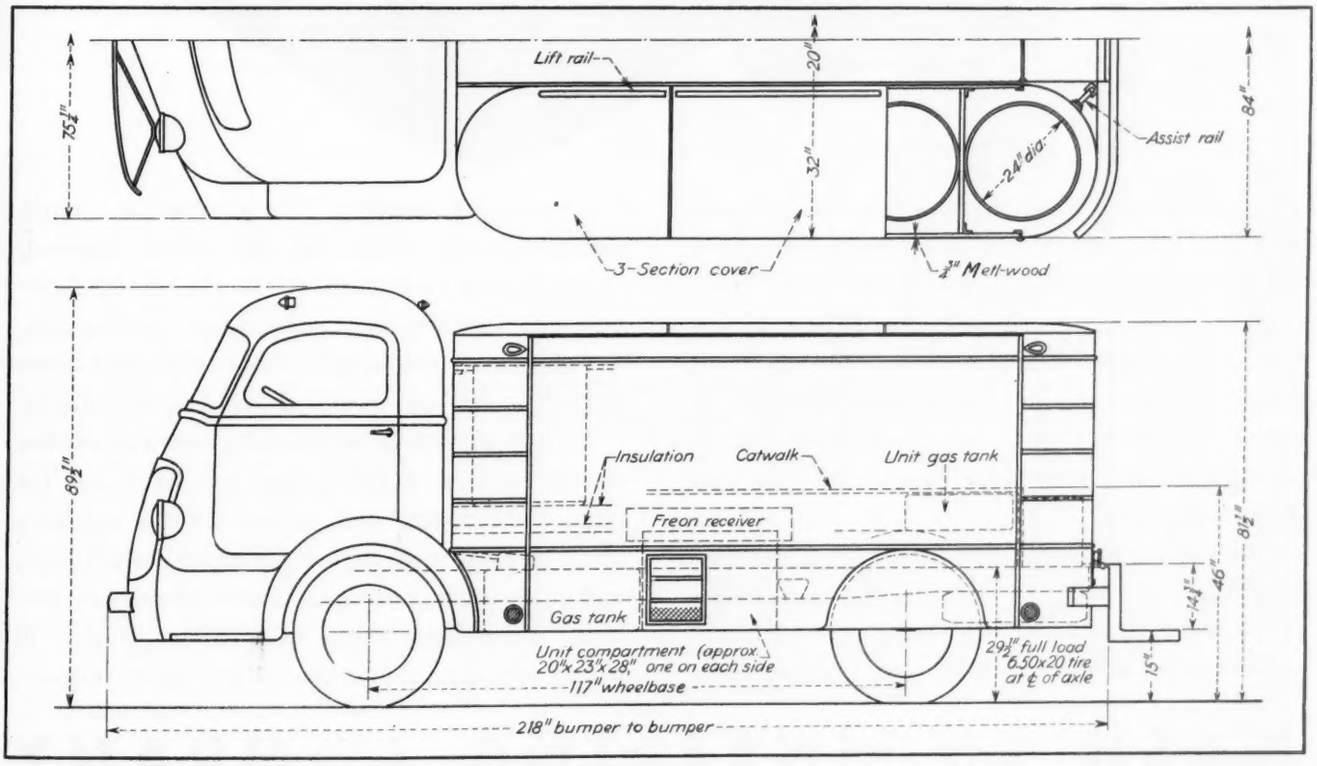
LEFT: The catwalk with the floor removed, showing the Freon receiver (in front) and the compressor gasoline tank (in rear). RIGHT: With both overall hinged covers lifted up and the unit covers removed, the driver-salesman assembles the particular units for his next delivery.

Eliminates Dehydration

The refrigerant Freon, F12, is circulated in the space between the inner and outer walls by means of a conventional compressor or compressors, two such compressors being used on the 77-cu. ft. payload space model, one for the unit on each side, as shown in the accompanying line drawing.

The unit maintains its food compartment at a temperature of within 2 deg. of the refrigerant, thus virtually eliminating dehydration. Except when warm, practically no frost is formed when moist foods are put into the compartment.

Because cold air does not rise and warm air does not descend unless some draft forces the cold air out, the covers of the units may be left off for considerable periods, while different items carried in the load are selected, without an appreciable change in temperature.



Side elevation and half-plan views of the standardized 77-cu.ft. Henney "Deepfreeze" body as mounted on an International 117-in. wheelbase cab-over-engine chassis. Ten 24-in. Deepfreeze units are mounted in this body.

Nash Pumps of "PYREX" BRAND GLASS
A new tool for the *Food Plant*

The Food Industries will find the new Nash Pumps of Glass particularly adaptable to the exacting liquid handling requirements of this field. Constructed of heat and shock resisting "PYREX" brand glass, they present a means of transferring liquid food products without impairment of flavor or quality. Food and glass have long been closely associated, and now Nash Pumps of Glass permit another step.

All working parts of these centrifugals, including impeller and casing, are constructed of sparkling glass, with complete transparency, permitting constant inspection of product for color and condition. If pump needs cleaning it is immediately made visible, and the pump may be readily opened, cleaned, and reassembled. A unique mechanical seal replaces the conventional stuffing box. Not only food products, but hot acids and brine cooled liquids are handled with equal facility.

Nash Pumps of Glass are at present available in two sizes, a 6000 gallon per hour unit for large installations, and a unit with a capacity of 10 gallons per minute for small installations, and laboratory and pilot plant operation. Bulletins describing these sensational pumps in detail will be sent immediately upon request.

NASH ENGINEERING COMPANY
238 S. WILSON ROAD • SOUTH NORWALK, CONNECTICUT

FOOD INDUSTRY NEWS

GENERAL NEWS • TRENDS • MEN • JOBS • COMPANIES • DECEMBER, 1941

Food Manufacturers Hear Defense Problems Outlined

Men from industry and government analyze steps that must be taken to meet current conditions

NATIONAL DEFENSE and its relation to the food industry was the central theme that made the 33rd annual convention of Associated Grocery Manufacturers of America, held in New York, November 5-7, the largest in its history. As usual, the report by A. C. Nielsen, president of A. C. Nielsen Co., on trends and influences in brand merchandising packed the assembly room. A new feature was the Nielsen study of merchandising problems in Britain under war conditions. Despite the fact that the market in Britain is not only a sellers' market, it is a scarcity market, the function of advertising and sales promotion is indispensable in maintaining a "consumer franchise" and even conditions of distribution.

Advice on Nutrition

Highlight of the three-day convention was the presentation by Paul V. McNutt, Federal Security Administrator, of the eighth annual AGMA award to Dr. R. R. Williams, who isolated vitamin B_1 (thiamin).

Accepting the award, Dr. Williams said that the nation depends primarily upon food manufacturers for the improvement of health and stamina made possible by new discoveries of nutritional research. After listing the six important vitamins, he said, "It is high time that we should be taking a detailed census of their occurrence in foods and exercise every reasonable precaution that our methods of manufacturing, distributing and preparing foods conserve these values and get them to the mouth." He criticized the tendency to rely on synthetic vitamins, "Only in a few cases, such as those of bread and flour, can we justify the expedient of artificial restoration of lost values."

Taking up the theme of national defense in his opening address, Paul S. Willis, president of AGMA, declared that the food industry, challenged to adequately and economically feed the nation, must reach a complete understanding of the defense program and its demands, and work out efficient, orderly ways of meeting these demands. The problem of a nutritionally underfed America must be shouldered by food manufacturers.

Clarence Francis, president of General Foods Corp., placed upon the food manufacturer the responsibility to produce maximum efficiency for both defense and civilian needs, and praised manufacturers for aiding Washington by attempting to solve their own problems arising from the defense program. The vastly improved research, new methods, new materials and machines and improved employee relations will more than cope with a great post-war market, if management and the government are able to plan and administer the transition effectively.

Food stamp plans and hot school lunches may have to be discontinued in a few months, warned Dr. Thomas Parran, U. S. Surgeon General, at the nutrition session. He also criticized current vitamin promotion. The solution of malnutrition is not "that we become a nation of drug takers, but that there be readily available an adequate supply of all the foods we need at the prices we can pay. As merchandisers you should make it easy for us to select what we need in the categories we can afford; as advertisers you should educate us as to what is good for the whole man as well as what will push a profitable brand."

No Need for Rationing

Despite the demands for food being made upon America, M. L. Wilson of the Federal Security Agency saw no need for food rationing in this country, with our present agricultural productive capacity, development of nutritional education and surplus commodity program.

Corwin D. Edwards, of the Department of Justice, said that nearly one-third of American families are inadequately fed, as proved by the medical examinations for draftees showing 50 percent of the rejections for physical

(Turn to page 74)

AGMA HONORS SCIENTIST

Dr. Robert R. Williams, right, chemical director of Bell Telephone Laboratories, receives the eighth annual award of Associated Grocery Manufacturers of America from Federal Security Administrator Paul V. McNutt. Dr. Williams isolated, synthesized and named vitamin B_1.

ADVICE ON NUTRITION

Dr. Thomas M. Parran, Surgeon General of the United States, left, Paul Cornell, nutrition consultant to the Federal Security Administration, center, and Paul S. Willis, president of Associated Grocery Manufacturers of America, discussing the proper diet at AGMA's 33rd annual convention last month. The first joint meeting of government and industry for promotion of proper nutrition was held at the convention.

OPM To Restrict Food Wrappers

Ban on lead and tin foil and on transparent cellulose expected shortly from Washington

An OPM order prohibiting the use of lead and tin foil for candy, gum and cigarettes was issued on November 24. This order banned the manufacture of the foil for specified purposes, including those named, after January 15, cut production meanwhile to one-third normal and prohibited its use for those purposes altogether after March 15. The difference in the effective dates permits the use of stocks on hand.

The first order, like the one limiting the use of transparent cellulose, which did not affect the food industries, is expected to be only the beginning. Active studies are being made regarding the effect of banning foil for such other food products as yeast, cheese and so forth. Studies are also in progress regarding the uses of transparent cellulose for food wrapping, and additional prohibited uses of both types of wrapper may be expected shortly.

Peanut Quota Announced

An edible-peanut marketing quota of 627,900 tons has been announced for 1942 by Secretary of Agriculture Wickard. Next year's acreage allotment will be 1,610,000 acres, as it was for the 1941 crop. In addition to the edible allotment, a goal has been set of 1,900,000 acres of peanuts for oil purposes, and growers are being encouraged to increase the acreage of peanuts for hogs.

HEADS ICE CREAM GROUP

L. E. Hurtz, of Fairmont Creamery Co., Omaha, Neb., was elected president of International Association of Ice Cream Manufacturers at the convention held in Toronto.

Dairy Equipment Gets A-5 Preference Rating

To make available the equipment necessary to handle an eight billion pound increase in next year's milk production, OPM has arranged to grant a preference rating of A-5 to manufacturers of milk cans and a limited preference of A-5 to manufacturers of hot-dipped tinned and tin plate dairy equipment. The plan went into effect on October 28 and continues until March 15, 1942.

Upholds Standard For Margarine

McNutt denies new hearing. Ice cream hearing date set. Dried milk finding affirmed by court

Hearings to consider ice cream standards were scheduled to begin December 1, but were postponed to January 5. Announcement of the proposed standards was in the *Federal Register* on November 1 and included proposals for ice cream, frozen custard, sherbet, water ices and related foods. Thomas C. Billig was designated as presiding officer. The macaroni hearing, twice postponed from September 29, was held in early November.

The Eighth Circuit Court of Appeals in St. Louis early in November affirmed the action of Federal Security Administrator McNutt in the dried skim milk finding reported recently (*Food Industries*, October, page 82, and November, page 70). This court action closes the case officially.

Margarine Standard Upheld

The oleomargarine standard was stoutly defended by McNutt in a statement issued on October 31. In denying the petition of the United Dairy Committee for a rehearing, Mr. McNutt made the following comments:

"Upon the evidence already in the record, there is no legal basis upon which . . . the use of diacetyl in oleomargarine (could be prohibited). . . . Even if there were an adequate basis for rescinding the entire definition and standard, and this were ordered, oleomargarine containing the ingredients named in the standard could continue to be manufactured with entire legality; that is to say, diacetyl and benzoate of soda could be used legally if clearly declared on the label. The same is true of artificial color, with the additional proviso that the heavy internal revenue tax on the colored article would have to be paid, as is now the case. In two respects, however, the situation would differ, if the definition and standard were recalled, from that now prevailing: (1) There would be no express legal requirement compelling oleomargarine to meet the fat standard now imposed by law upon butter; (2) oleomargarine making claims for vitamin A content could not be required to contain a definite amount of each vitamin. . . Recall of the definition and standard for oleomargarine would result in the removal of necessary protection to the buying public."

Army Buying Direct

Quartermaster buying of canned goods has been extended to include contracts negotiated directly with canners at their plants as a means of extending the Army supply to a greater number of processing plants.

Defense Problems Outlined

(*Continued from page 73*)

causes with malnutrition a major contributing factor. An adequate diet has made most of those rejected fit for service in less than a year. We must have vigorous use of antitrust laws to deal with the nation's food problem, he stated. Many substantial obstacles to the efficient processing and distributing of food can be cleared away by antitrust proceedings, Mr. Edwards said.

Addressing the closing session of AGMA, Charles Wesley Dunn, general counsel for the association, stated that private-brand distribution monopolized by a few powerful dealers is a definite threat to small dealers who depend on standard brand distribution for their existence. The standard brand manufacturer to meet this competition must effect a preferential demand for his product on the basis of superior or distinctive value and the basis of rapid turnover, bringing down his prices to meet those of the private brand dealer. The standard brand manufacturer has a strong market position which helps to counter sale of private brands.

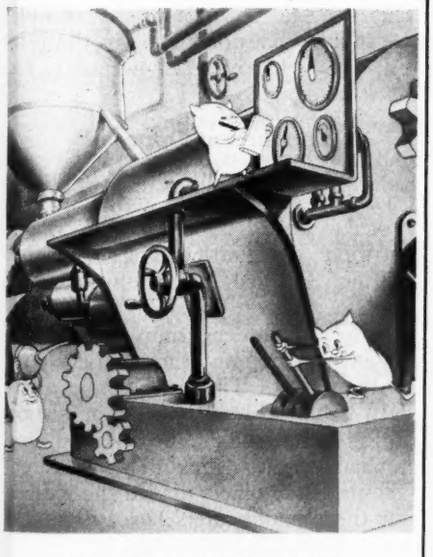
There can be no expansion of plant or facilities by the food manufacturer during the present emergency except where it is vitally needed for defense, Donald M. Nelson of the Supply, Priorities and Allocations Board told AGMA members. Shortages of critical materials require that this and other industries operate on a maintenance basis from now on. Foodstuffs have an important part to play in the prevention of a food price spiral. By avoiding speculative buying, refraining from building up inventories and by adjusting their purchases to current business requirements, manufacturers can ease the pressure on food price structure.

Argue Standards For Spaghetti

Specifications for macaroni and spaghetti products discussed at F&DA hearing in Washington

No STANDARD was proposed for how long spaghetti should be cooked, but all other vital statistics of this and related products were thoroughly discussed at an F&DA standards hearing. Originally announced for September 29 and twice postponed, the hearing began on November 3 and adjourned November 12 after sessions on six days. Briefs are due by December 15.

Common or usual names for the products under discussion at this hearing were the principal stumbling block to a short hearing. The Food and Drug Administration proposed that "macaroni" be a tubular product, 0.12 to 0.25 in. in outside diameter; "spaghetti" to be a tubular or cord-shaped product, 0.06 to 0.12 in. in diameter; "noodles" must have a minimum of 5.5 percent egg solids content and be ribbon shaped; and all others would be "macaroni product" or "noodle product," suitably modified by adjective or trade name to describe the specific product. "Vermicelli" was a name thought not to be sufficiently understood by the American consumer, because of its limited use, to be an unqualified product name. "Vermicelli spaghetti" was suggested as a more informative name. No objection was offered to the use of additional



FINANCIAL MICKEY MICE

"It takes a lot of work around here to make this business go." That is the thought put across by this cartoon from the film shown at the recent meeting in Chicago of the stockholders of General Mills, Inc. This type of interpretation of the otherwise dry facts of a financial report has been found effective public relations.

"Soupy"

Still outdoes Boogy-Woogy!

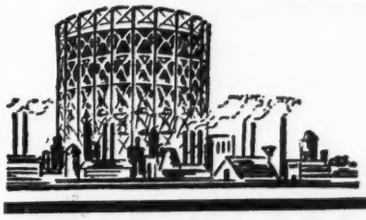
Wherever "soupy" sounds, soldiers come running . . . as they always have.

And it's up to you, and all the other food manufacturers to see that they, and all the rest of us, get three squares no matter what.

Kemp engineers are at your service to help you meet your increasing responsibility to defense, to the public, to your stock-holders.

Kemp equipment helps, not only with production problems, but with management problems, in cutting fuel consumption from 15 to 40 percent or even more!

Kemp automatically-controlled burners in ovens, roasters and high-temperature cookers are supplied by the Kemp Industrial Carburetor with completely premixed gas and air to provide utmost heat liberation, uniform temperatures, absolute flame characteristics and pressures. For engineering assistance, Address **The C. M. Kemp Manufacturing Co., 405 East Oliver Street, Baltimore, Maryland.**



KEMP of BALTIMORE

MATERIAL SHORTAGES

Under present conditions, many a manufacturer may find it necessary to switch from one wrapping material to another . . . We, therefore, point out that

Our machines are adaptable to any type of wrapping material

This applies not only to our new machines, but to a vast number already in the field.

The VERSATILITY of our machines is reflected not only in their adaptability to various wrapping materials, but also in their wide range of *adjustability* for different sizes . . . And they can be designed for many forms of wrapping, including easy-opening devices, combination type wraps, etc.

★ ★ ★

Now, more than ever, it pays to invest in the most versatile wrapping equipment—machines that provide for FUTURE as well as present requirements. Why not get in touch with our nearest office for information regarding our latest high-speed, cost-reducing models?

PACKAGE MACHINERY COMPANY
Springfield, Massachusetts
NEW YORK CHICAGO CLEVELAND LOS ANGELES TORONTO
Buenos Aires, Argentina: David H. Orton, Maipu 231
Peterborough, England: Baker Perkins, Ltd.
Melbourne, Australia: Baker Perkins, Pty., Ltd.

PACKAGE MACHINERY COMPANY
Over a Quarter Billion Packages per day are wrapped on our Machines

Italian names with the word macaroni or spaghetti if these were helpfully descriptive of the product.

Optional Ingredients

Optional ingredients were discussed at length. Use of soy flour in macaroni was questioned particularly. Although the present practice is to use as much as 15 or 20 percent of the soy flour in the flour ingredient, the industry asked that a 5 or 10 percent minimum be established in the standard. F&DA officials were inclined to feel that 15 or 20 percent would be a more reasonable minimum. Naming of the product was also a problem. "Soy macaroni" was thought to be misleading because soy flour would not be the only flour used. Some such name as "semolina and soy flour macaroni" was informally suggested by an F&DA witness.

Official opinion of use of other optional ingredients could be summarized approximately as follows: "Milk macaroni" should be made with whole milk as the only liquid ingredient; "vegetable macaroni" should contain a minimum of 3 percent solids of the named vegetable (spinach, tomato, carrot were some of the vegetables discussed); a "glutenous macaroni" should be 18 percent protein or higher; "whole wheat macaroni" would use whole wheat flour as the entire flour ingredient rather than semolina, or durum or plain flours. Seasonings if used would be declared, but egg color must not be simulated by use of any seasoning.

Macaroni manufacturers also requested permission to use 2 percent white of egg in quick cooking macaroni. This was said to be necessary to hold the tubular macaroni shape in the thin wall product which is necessary for quick cooking.

Enrichment Opposed

Vitamin and mineral addition to macaroni and related products was viewed as not advisable by the food and nutrition committee of National Research Council. Macaroni manufacturers were not prepared for such a negative recommendation and did not present any vitamin or mineral evidence for the record. They requested a recess until February 1 so that a more elaborate presentation of the vitamin and mineral question might be prepared. The presiding officer denied the request but the manufacturers have petitioned for a reversal of this ruling.

Canadian Pork For Britain

CANADIAN hog producers will provide Great Britain with 600,000,000 lb. of pork products this year, under the 1941-1942 Canadian-British bacon agreement.

Bottlers Examine Defense Position

Farley tells ABCB that industry is necessary. Dr. Parran speaks of need. Igleheart gives advice

THE INDUSTRIAL problems growing out of defense occupied the attention of bottlers at the meeting of American Bottlers of Carbonated Beverages in Philadelphia, Nov. 10-14. A point that concerns the bottlers is whether their products might be considered in the luxury class. In this connection, the speech by James A. Farley, chairman of the board of the Coca-Cola Export Corp., was significant. The former Postmaster General told the bottlers that every industry must examine, objectively as may be, the place of its product in time of war. And close examination of the carbonated beverage industry may show that instead of being one whose operations might be curtailed it is in reality one whose product is needed both by the Army and by civilians, and further that it is economically an important nationwide activity. Mr. Farley cited that fact that there is a big demand for soft drinks among the armed forces of the country, and an ever-increasing demand among the civilian population. From the facts at hand, he concluded that the product is a powerful aid in the defense effort on the military and industrial fronts; that it is an influence helping to forestall the threat of inflation; that it is a factor tending to sustain public morale; that it is an energy-food item; and that it is an element in preserving the established economy of the country.

Psychological Vitamins

Dr. Thomas Parran said that he understood that the military authorities have requested that an abundant supply of carbonated beverages be made constantly available at the far-flung bases which are being manned for our protection as the outposts of American defense. "You have a great advantage," he said, "in that yours is an industry which can capitalize on the psychological values contributing to our national culture. As a doctor concerned with nutrition, I might refer to them as psychological vitamins. Man does not live by bread alone . . . Human beings need the plus element which makes for zestful living and it comes from sharing good food and pleasant drink in cheerful companionship."

Dr. Parran also cautioned the bottlers against fortifying their products: "I do not agree with those who ask you to add synthetic vitamins to your good, clean wholesome products. Let us be sure to get all the vitamins we need from a nourishing well-balanced daily diet."

NEW ABCB PRESIDENT
Edward Wagner, of Cincinnati, was elected president of American Bottlers of Carbonated Beverages at the annual meeting in Philadelphia last month.

A third featured speaker at the convention was Austin S. Igleheart, executive vice-president of General Foods Corp., New York. Speaking on "The Food Industry and the National Emergency," he pointed out that an all-time high in the buying power of low-income families is likely to boom business for consumer goods. And on the not-so-optimistic side, Mr. Igleheart said that "there may not be available for you all the metal to make all the bottle caps which you could use. Maybe some bright person might work out a scheme for the return of caps as you use returned bottles. In the production of glass, the use of chemicals may represent a limitation on the supply of bottles . . . I know there is now a serious shortage of paper."

Inflation Danger

Speaking on rising prices, Mr. Igleheart said that there is a general feeling that the present price level is about right. And "any spiraling of prices from this level will undoubtedly bring about additional increased demands for higher wages. The more enlightened elements of the food industry are extremely eager to avoid inflation, because, while it is a joy-ride going up, there is such a big bump at the bottom that virtually no one in the industry could emerge unscathed. Furthermore, there would be a loss much greater than any possible profit or advantage that could be had during the upward price spiral.

THE famous Seabrook Farms' Cumberland Warehouse Corp. is maintaining zero temperature in its fleet of eight big trailer trucks, operating from Bridgeton, N. J. to such distant points as Chicago and Florida. Frick Refrigerating Units, with special electric drive, carry the cooling load with both dependability and economy. *And,* Frick Refrigeration is used for quick-freezing and storing 35 million pounds of food annually, at Seabrook Farms. Let us quote on *your* cooling needs.

DEPENDABLE REFRIGERATION SINCE 1862
FRICK CO.
WAYNESBORO, PENNA. U.S.A.

Experts Discuss Locker Problems

Location, patronage, chill-room space, capacity, packaging and desiccation among subjects

THE PLACE of the frozen food locker plant in a community and the technology and economics of its operation were the themes of the Food Preservation Conference held at the University of Tennessee, October 23-24, with the cooperation of American Society of Refrigerating Engineers.

L. N. Baker, of TVA, emphasized the need of study of the economic requirements of a community before building a locker plant. Too frequently plants have been built where the farmers have nothing to store in them, and experience in the TVA area has shown that often soil improvement must precede the locker plant or there are no perishable crops deserving freezer storage.

Ample chill-room space for hanging meats and precooling products intended for freezer storage is a crying need in most locker plants. One square foot of chill-room floor space per locker is the customary area in small installations,

". . . I don't know. He just said would we mind if he sat there till midnight."

with 3 sq.ft. per locker in large plants, while the minimum needed for 300 locker plants is 300 sq.ft.

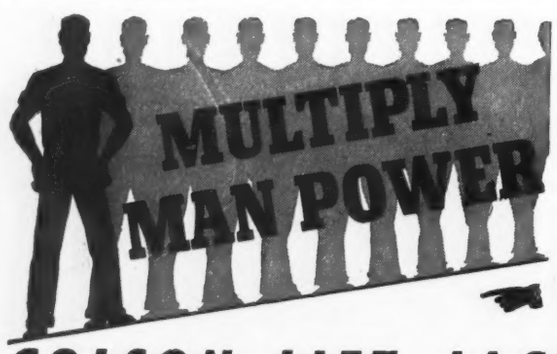
Significant facts about locker patronage were brought out by S. T. Warrington, Farm Credit Administration, reporting on a survey of the locker plants of the United States. Out of 1,781 usable questionnaire returns it was found that 71 percent of the patrons were farmers, but that only half the patrons were farmers in the south central states in contrast to 76 percent in the north central states. Farmer patronage varies even more widely by states.

The average capacity of the lockers surveyed showed 328 per plant, with the average trending downward in size. Locker plants associated with ice plants account for the size trend, which is found not to be due to lack of financial success with large plants, for locker plants associated with creameries average 358 lockers per plant and have the highest percentage of rentals. A new development is the group of branch locker plants served by the central service locker plant in which the patrons' foods are processed and frozen for storage in the branches.

Desiccation or drying out of products in freezer storage was discussed by Dr. J. G. Woodroof, food technologist of Georgia Agricultural Experiment Station, who pointed out that improper packaging for storage could result in weight losses of 10, 20 and even as high as 30 percent per year. Furthermore, the product loses also color, aroma, flavor and vitamins.

Importance of moisture-vapor-proof wrapping was repeatedly stressed by Harry Carlton, University of Tennessee, and by S. T. Warrington.

Technical discussions on Freon vs. ammonia as a refrigerant, and the rate of freezing in large masses were given by C. T. Baker of Atlanta and W. J. Finnegan of Los Angeles. Wayne Carver, editor of *The Locker Patron*, and L. V. Burton, *Food Industries*, both spoke on the place of the frozen locker plant in food preservation during a national emergency.



with a low-cost

COLSON LIFT JACK SYSTEM

When man power *must* be multiplied and fast-increasing production calls for greatest efficiency—the Colson Lift Jack System puts skids under handling costs.

The Colson System is *complete*, eliminating extra pick-up, extra set-down, extra handling.

The Colson System is *simple*—a platform with wheels on one end, and a two-wheeled jack that engages the front of the platform converting it into a sturdy, easy-to-roll-truck.

The Colson System can be installed with a *small* investment. A hundred dollars will buy several platforms and a lift jack. Many users report that their investment was returned in less than a year in actual savings in handling costs alone.

To multiply your man power, ask us for more complete information

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CASTERS • INDUSTRIAL TRUCKS AND PLATFORMS • LIFT JACK SYSTEMS
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Government Issues Food Specifications

FEDERAL specifications for processed foods are now being issued which include the AMS grade standards for those foods. Already printed (November 12) were Federal specifications for dried prunes, tomato catsup, and canned apples, apricots, beets, carrots, sweet corn, peaches, pears, peas, tomato juice and tomatoes. Other foods for which approval has been granted for printing Federal specification include canned apple butter, applesauce, asparagus, lima beans, snap beans, cherries (red sour and sweet), fruit cocktail, grapefruit juice, fruit jellies, sweet potatoes, preserves, salmon, sauerkraut, spinach and turnip greens.

This work is the result of the provisions committee of the Federal specifications executive committee. Paul M. Williams of AMS is chairman of the processed foods subcommittee, which is now considering peanut butter, dehydrated white potatoes, dehydrated cab-

bage, dehydrated onions and canned pineapple, pumpkin (and squash), grapefruit, olives, beans (with or without pork), plums, dried prunes, figs.

Another Job for Livingston

GEORGE LIVINGSTON, who has been priorities specialist and acting chief of OPM's food branch for several months, is now the food expert in OPM's new Conservation Branch headed by Lessing J. Rosenwald. In his new assignment, Mr. Livingston will act as the Conservation Branch's contact with the Food Branch in working out ways of conserving use of critical materials by the food industry.

Industry Aids Defense

A MAJOR problem of the war on waste inaugurated by the Bureau of Industrial Conservation, OPM, is a simplification program to cut down the number of varieties or styles in every field of manufacture. The program, essential to save vital materials for national defense, is rapidly expanding through industry advisory committees set up by OPM to work out simplified practice for all types of industry.

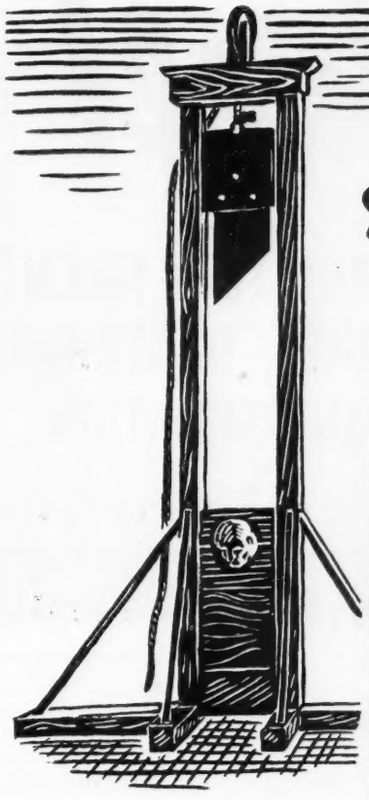
SCHEDULE OF EVENTS

DECEMBER

1– 6—Exposition of Chemical Industries, Grand Central Palace, New York.
2– 3—American Butter Institute, Palmer House, Chicago.
2– 5—American Society of Refrigerating Engineers, 37th annual meeting, Hotel Jefferson, St. Louis, Mo.
3—National Dairy Council, annual meeting, Palmer House, Chicago.
4– 5—Northwest Frozen Foods Association. Seattle, Washington.
4– 5—Tri-State Packers Association, Traymore Hotel, Atlantic City.

JANUARY

4–17—American Institute of Baking, 4th annual Cake Course, Chicago.
7—National Pickle Packers Association, Palmer House, Chicago.
7– 9—Northwest Canners Association, anual convention, Seattle, Washington.
12—United Brewers Industrial Foundation, 5th annual convention, Miami Biltmore Hotel, Coral Gables, Fla.
13—Southeastern Millers Association, Brown Hotel, Louisville, Ky.
17–24—United Fresh Fruit and Vegetable Association, annual convention, Belleview Biltmore Hotel, Belleair, Fla.
19—Cooperative Food Distributors of America, Sherman Hotel, Chicago.
19–20—American Bakers Association, Wholesale Cake Branch, Hotel Sherman, Chicago.
22—National Peanut Week.
25–27—National Food Brokers Association, Palmer House and Morrison Hotel, Chicago.
25–27—National Sugar Brokers Association, Chicago.
25–27—Potomac States Bakers Association, Lord Baltimore Hotel, Baltimore, Md.
26–28—National American Wholesale Grocers Association, Chicago.
26–30—Canning Machinery and Supply Association, Stevens Hotel, Chicago.
26–30—National Canners Association, annual convention, Stevens Hotel, Chicago.
26—National Macaroni Manufacturers Association, Morrison Hotel, Chicago.
26–27—National Preservers Association, Morrison Hotel, Chicago.
26–29—National Quick Frozen Foods Exposition, La Salle Hotel, Chicago.



A Nice Smooth Shearing Cut

Think what you will about the guillotine, it never fails to do a quick, neat job. The *angle* of the blade did the trick. . . . Instead of hacking or chopping, it *sheared.* And now, for the first time, this *smooth shearing action* has been built into a high-speed, high-production *rotary knife cutter,* designed and built by Robinson. All of the advantages of Robinson Heavy Duty Knife Cutters have been multiplied by this new and exclusive feature.

Without vibration, without developing excessive temperatures, it will reduce to desired size, everything from coconut shells to milk chocolate.

Cutters are available with 3, 4 or 5 knives depending on processing requirements, with interchangeable screens of varying fineness which makes a single machine available for processing a wide variety of products.

Pneumatic Collectors can be furnished together with elevators, conveyors, and other materials handling equipment for a complete, ready-to-operate installation.

Trained and experienced engineers will answer your inquiry; write us regarding your problems.

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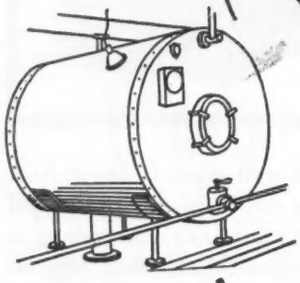
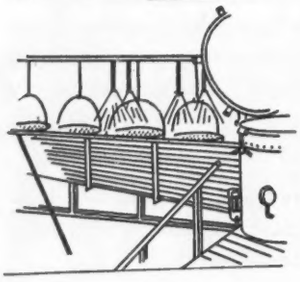
MANUFACTURING COMPANY
71 PAINTER STREET MUNCY, PA.

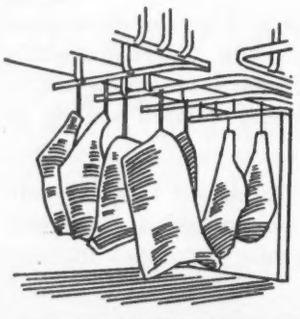
Stop Thief!

STOP THAT SILENT THIEF, BACTERIAL CONTAMINATION...

Use HTH Products to Prevent Spoilage Losses, Guard Purity







■ Food and beverage plants alike often find that bacterial contamination causes real dollars and cents losses both in spoilage and in hard-won customer acceptance. Food plant operators need not risk such losses, however, when effective bacteria control is so simple and inexpensive.

HTH Products (HTH, HTH-15, Lo-Bax) can be depended upon for every phase of sanitation throughout the plant. For HTH Products are chlorine sterilizers in powder form, convenient, always *full* strength. Added to water they form quick-acting germicidal hypochlorite solutions of any required strength to treat all surfaces which may need decontaminating. HTH Products are effective, easy to use, so economical they can be applied freely throughout the plant.

Write us for literature showing how HTH Products can help combat the spoilage problem in *your* particular plant.

Use HTH Products...In milk storage tanks, tank trucks, etc.

Use HTH Products...In cooling tank water in canneries.

Use HTH Products...In all departments of meat packing plants.

HTH PRODUCTS

THE MATHIESON ALKALI WORKS (INC.) 60 E. 42ND ST., NEW YORK, N. Y.

HTH PRODUCTS (HTH, HTH-15 and LO-BAX)...NUFOS...DRY ICE...CARBONIC GAS...AMMONIA, ANHYDROUS and AQUA...CAUSTIC SODA...SODA ASH...BICARBONATE OF SODA...LIQUID CHLORINE...BLEACHING POWDER...PH-PLUS...SYNTHETIC SALT CAKE...SODIUM CHLORITE PRODUCTS

Surplus Food Program May Be Curtailed 25%

RENEWED efforts to pare down the scale of Surplus Marketing Administration's domestic distribution of "surplus" foods through blue stamp, school lunch and similar programs are shaping up as part of the current talk in Washington for reducing non-defense expenditures. The Budget Bureau is expected to recommend about a 25 percent cut in SMA's $213,000,000 fund for the fiscal year beginning next July.

Not all of this reduction—even assuming it was approved by Congress—would be at the expense of the food stamp program. SMA conducts a number of cotton programs also. The largest portion of any reduction in funds for domestic programs would come in food distribution programs, however, and probably through tightening the eligibility rules for the stamp plan. At present, practically every family receiving some form of Government aid is eligible to participate in the stamp plan; with less funds, SMA might restrict eligibility to direct relief families, eliminating WPA workers.

SMA Will Maintain Scope of Stamp Plan

SINCE last July, the stamp program has been running at a rate of $120,000,000 annually. SMA is determined to maintain the machinery for this type of food distribution through retail channels on the grounds that it provides a medium for absorbing post-war shock. Therefore, any reduction in funds available will mean curtailment of eligibility, rather than of either scope or type of products on the list.

Although admittedly the program is gathering some aspects of defense nutrition, SMA still looks upon the plan as primarily a means of maintaining farm prices. Where before the purpose was to keep farm prices from falling below cost levels, however, now the idea is to use the program to help maintain the prices which the Department of Agriculture has promised farmers as an inducement for increasing production of high protein foods. This is why, for instance, butter and pork have been returned to the food stamp list—because the products were falling below price levels which Agriculture wishes maintained as a production stimulant.

Army Makes Tomato Bread

THE SAN FRANCISCO Bakers and Cooks school operated by the Army Quartermaster Corps has developed a reddish-colored tomato bread by adding tomato

British-Combine

CHILDREN HELP FEED ENGLAND

Too young to participate in the grim phases of the war, these British children do their part by picking blackberries in the evening after school. The Women's Institute, St. Austell, Cornwall, made half a ton of blackberry jam from berries picked by the children. The women made the jam in the evenings and on Saturdays.

juice or canned tomatoes to the dough mixture. The bread isn't—and won't become—standard to Army diet, but the product is a colorful novelty with a different flavor and better-than regular-bread vitamin content.

To regular dough mix, bakers add both powdered milk and either juice or the canned tomatoes. From a vitamin standpoint, tomato bread adds both A and C, the former being of military significance because it is the integral component of the coloring matter of the visual membrane of the eye required for normal vision in dim light or darkness.

Light-truck Output Cut

PRODUCTION of light trucks for civilian use in January, 1942, will be curtailed 35.9 percent below output in the same month this year under an order issued on November 14 by the Director of Priorities, OPM. Companies manufacturing both passenger cars and light trucks (those less than 1½ tons) may exceed the ceiling on truck output provided passenger car production is correspondingly reduced.

Cocoa For Defense

COCOA has become an important food item in Britain's defense program, finding increased use among civil defense workers, in the Royal Navy and convoy crews, and appearing regularly on the Army diet sheet. One million cocoa rations, imported from the west coast of Africa, are now stored secretly throughout Britain for the needs of military and civil defense.

Food Plants Escape Rationing of Power

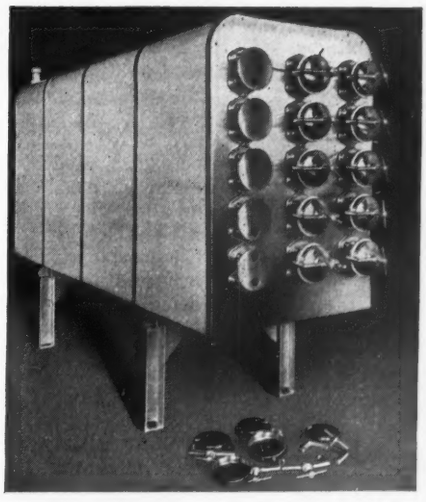
OPM's first electric power rationing program found food storage and processing plants, for the most part, exempted from curtailment. The program was ordered for part or all of six Southeastern states where a combination of lack of rain to keep hydro-electric storage reservoirs full and an unprecedented demand for aluminum created a serious energy shortage.

The original order for curtailing consumption by utility customers using 10,000 kilowatt hours monthly or more provided a general exemption for "refrigeration and food preservation plants." By interpretive ruling from OPM's on-the-spot headquarters at Atlanta for administering the order, Power Chief J. A. Krug included in this category meat packers, dairies, manufacturers of dairy products and abbatoirs, as well as refrigeration storage plants and ice houses.

These establishments, like all others whether exempt from the percentage curtailment or not, were required to observe the provisions of the curtailment order prohibiting use of electricity for signs, display lighting, decorative lighting and similar nonessential uses.

CHESTER

Ammonia Cooled Internal-Tube Coolers



solve many mechanical problems—particularly serviceable in pre-cooling before storage tanks, or directly into transportation tanks.

Designed for use with patented York ammonia liquid circulating system which maintains constant back pressure on ammonia to prevent freezing. Sanitary all stainless steel construction. Heads easily removed for cleaning.

Complete details furnished on request.

CHESTER DAIRY SUPPLY COMPANY

9th & Hyatt Sts. ***Sanitary Heat Exchangers*** **Chester, Pa.**

It's in the Bag!

The biggest and best potato chip business in your locality is "in the bag" for the owner of a

FERRY

CONTINUOUS POTATO-CHIP MACHINE

The old time batch method can't compete in quality, volume or price with the superior product of these completely automatic machines. No rancid chips, no underdone or burnt ones. Every chip is uniform in color, crispness, saltiness and taste—the kind that bring in new customers and hold old ones. Here's why these machines are invariably big profit makers: Starting from raw unpeeled potatoes every operation except inspection of the peeled potatoes is completely automatic and continuous . . . peeling, slicing, frying, drying, cooling and salting are all under "push button control"—And better yet, production costs are far lower than with other manufacturing methods . . . Made in 5 sizes with capacities from 50 to 350 lbs of chips per hour . . . if you are in the potato chip business to make money it will pay you to get complete details of Ferry Machines today . . . Write for Bulletin.

ALSO MAKERS OF:

SLICERS & AUTOMATIC SLICER FEEDERS

CAN WASHING MACHINERY

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HARRISBURG, PA.

AMA Will Resume Packaging Awards

AMERICAN MANAGEMENT ASSOCIATION, which suspended the Irwin D. Wolf awards for distinctive packaging in 1941, pending a study of the situation, has announced a new annual packaging award for achievement on a purely scientific and professional basis.

An Irwin D. Wolf Trophy will be awarded to the company which, in the opinion of the judges, has released during 1941 the package most nearly meeting the ten official standards of excellence. The winning package will be that which is accorded the highest rating on display visibility, buying information, consumer convenience, use of color, use of typography or lettering, beauty of design, merchandising ingenuity, construction ingenuity, production economy and use of materials.

CAPITAL VIEWS

LABEL LENIENCY—Where a portion of a food standard is still being litigated, there is no effort of the Food and Drug Administration to actively enforce that portion of the standard. This leniency in Washington is very helpful to food processors, since premature enforcement might compel a change in labels now with the privilege of changing again later if the industry gets certain relief sought in the courts. The preserve standards are a good example. There is no tolerance with respect to the 55-45 ratio of sweetener to fruit. But it is permissible to use any sweetener that the preserver may choose, without label declaration, until the courts may finally decide what is a proper official policy in this particular. In giving this helpful extension of time, the F&DA officials are merely treating the portions of standards now under controversy in the courts just as they do the pending standards being formulated but not yet promulgated.

HELPFUL EXCHANGE—Scarce materials are being pooled in many cases by cosmetic manufacturers. Thus, the shortage of one is made up by the surplus stock of another manufacturer. It looks as though certain food industries might imitate this type of industry-wide cooperation.

EXTREME ECONOMY—Distributors of petroleum products must discontinue the use of any metal containers as a defense aid measure. Such order was issued the last week of October, to take effect immediately. Comparable restrictions for other containers, including many for food, may be expected. Some of those already under way are indicated by recent transparent cellulose rulings. (See next paragraph.)

TRANSPARENT WRAPS RESTRICTED—Transparent cellulose may no longer be used for packaging a long list of commodities. Absolute restriction was imposed by a priority ruling L-20, issued November 8. When issuing this order, the Division of Civilian Supply gave notice that it was planning to extend this curtailment to the packaging of many manufactured foods and tobacco. The shortage of transparent cellulose is caused by the shortage of the chemicals required to make it, especially chlorine, phenol and glycerine. These shortages promise to get worse, rather than better. Users of these packaging materials must get ready soon to do without.

LIGHTER CARTONS—To reduce the quantity of paperboard required in making both corrugated and solid-fiber shipping containers, there have been modifications in official regulations prepared because of the encouragement of OPM. Many small packages now can be made with thinner cardboard than formerly, and other liberalization of weight and size requirements are provided. This is possible through amendment of the official Interstate Commerce Commission regulations. OPM estimates that shippers may save as much as $25,000,000 worth of paperboard; and the food industries are very importantly affected.

MORE MILK DEMANDED—Plans of OPM include provision of equipment to handle an increase of milk production next year amounting to eight billion pounds. In support of this huge industry increase, intended primarily for manufactured milk products, there have been issued new authorizations for steel, tin and other commodities needed to make the requisite cans and processing equipment. Some idea of the magnitude of the new business expected is shown by the fact that OPM guesses there should be 955,000 new milk cans made in addition to 385,000 cans normally needed for replacement. Comparable allocations on equipment for cheese factories, milk condenseries, etc., is anticipated as specific requirements develop.

ALCOHOL FROM SUGAR—Despite contemplated sugar shortages an arrangement has been made to encourage making industrial alcohol for defense purposes from raw sugar, instead of from inedible molasses. As edible molasses and raw sugars are so used, the costs increase. Hence, OPM has authorized a very high price for alcohol made from raw sugar, a price just double that currently permitted for normal industrial alcohol supplies.

FORWARD BUYING—At least by implication government officials are criticizing industrial users of sugar for their recent forward buying practices. These practices, the government men state in press releases, may cause some shortage of sugar for the general public. This looks a bit like an effort to hang the sugar shortage blame on the food industries. It is in striking contrast with the glib insistence a few months ago that there was no danger of a shortage.

AWARD FOR QUALITY

C. J. Wells, manager of the Taystee Bread bakery at Newark, N. J., presents to Henry Berry, production superintendent, a scroll signifying the Craftmanship Award made to the Newark plant by the national Taystee organization. Made at intervals by a committee of impartial bread experts, the award goes to the Taystee unit whose product receives the highest quality rating over a sustained period of time.

To Make Fuel From Crops

A SEMICOMMERCIAL plant for the production of motor fuel from farm products has been practically completed at the Department of Agriculture's Northern Regional Research Laboratory at Peoria, Ill. It will have a capacity of 500 gal. of alcohol a day. The first work will be on corn, then on sweet potatoes, white potatoes, wheat and other carbohydrate crops.

Edible Oils Inventories Apparently Increased

WHILE IMPORTS OF FATS and oils into the United States have been increasing and August imports were considerably larger than in August 1940, stocks have been decreasing with oil moving into consuming industries at higher rates.

For example, coconut oil stocks fell off by about 23,000,000 lb. in September, and apparent consumption for the third quarter increased from 148,000,000 lb. to 187,000,000 lb. The same general statistical picture holds for the other imported edible oils.

The fact that prices of these oils have changed but little during the past month indicates that much of the apparently increased consumption is not actually going to the ultimate consumer. Rather, this decrease in oil stocks in the face of increased imports represents stocking ahead by wholesalers and industrial users.

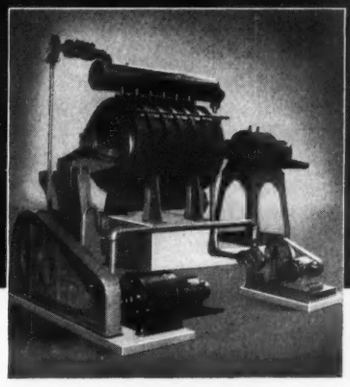
Food Commodity Prices Start Upward Again

AFTER SHOWING only a slight increase in the period from mid-September to mid-October, commodity prices started up again during the four weeks from October 18 to November 15. The *N. Y. Journal of Commerce's* weekly

CONSTRUCTION NEWS

	Pending (thousands)	Awarded November (thousands)	Total Awarded 1941 (thousands)
Bakery	$180	$40	$4,045
Beverages	490	95	7,832
Canning and Preserving	84	94	659
Cold Storage Plants	90	.....	780
Confectionery	.....	50	368
Grain Mill Products	180	40	6,634
Ice Manufactured	.....	.....	310
Meats and Meat-Products	45	.....	2,138
Milk Products	710	195	2,792
Miscellaneous	810	840	6,732
	$2,589	$1,354	$32,290

Make 30 tons of ICE at $1.25* per Ton in a 9x12 Ft. FLOOR SPACE



VILTER PAKICE!

Vilter 30-ton PAKICE Unit with Briquett Attachment. Requires less than 9x12 feet of floor space.

Other PAKICE Units in daily capacities of ½, 1, 2½, and 5 tons and up to 30 tons in 5 ton increments.

★ *Depends upon local power costs*

Imagine making all the Ice you want . . . at $1.25 per ton* . . . 30 tons of Vilter PAKICE Briquettes . . . in a 9x12 FOOT SQUARE of floor space!

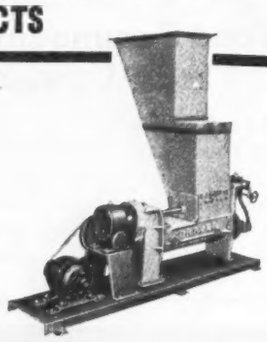
Many Meat Packers are saving up to 70% on Ice Costs, making Ice WHEN and WHERE they need it, and saving valuable floor space for more profitable use in production or storage. And, even more important, they get better ice, for Vilter PAKICE lasts longer, offers better refrigeration, packs easier around perishables, has no hard chunks or sharp points to damage delicate flesh, or vegetables, or damage cutter and grinding knives. (A particularly valuable advantage in sausage making.) And Crystalform PAKICE may be made into Briquettes for car icing at similar low cost.

Make these savings . . . Enjoy these advantages . . . in YOUR Plant. Write today for your story of VILTER PAKICE SAVINGS!

Superior Since 1867 VILTER Air Conditioning Refrigeration . . .

THE VILTER MFG. COMPANY
2115 S. FIRST STREET
MILWAUKEE, WISCONSIN
Offices in Principal Cities

GUMP EQUIPMENT FOR BETTER FEEDING, SIFTING AND PACKING OF FOOD PRODUCTS



DRAVER FEEDERS: Accurately regulate flow of dry, powdered or granular materials from bins and hoppers to various production machines. Installed in groups with a Master Drive they make a complete continuous mixing system for blending two or more products to exacting formulas.

BAR-NUN SIFTERS: Mechanically controlled full rotary motion assures complete, thorough single or multiple separations. Crowds large capacity into small floor space. Our engineers will gladly suggest an efficient installation for your needs.

VIBROX PACKERS: Efficient, smooth running, vibrating packers that usually pay for themselves through reduction of labor, handling and container costs. Made in 4 sizes to pack containers from 5 to 750 lbs.

WRITE FOR COMPLETE INFORMATION

B. F. Gump Co

Established 1872

454 So. Clinton Street Chicago, Illinois

commodity price index, at 95.8 on the earlier date, rose to 96.3 on November 15, 1941. The same publication's grain index rose from 80.9 to 84.1 during the period and it's food commodity index upped from 91.3 to 92.1.

During this same four weeks period, most individual food commodity spot prices moved up. Wheat, No. 2 dark winter, Kansas City, rose from $1.08 to $1.11. Flour fell off from $6.35 to $6.15 per bbl. Corn, No. 3 yellow, Chicago, rose from 66c. to 68½c. Beef fell from 18c. to 17c., while lamb dropped from 19c to 18½c. and pork loins decreased from 23c. to 21½c. Lard increased, going from $10.20 to $10.40. Among the dairy products, butter jumped from 34½c. to 37½c., eggs rose steeply from 32c. to 38½c. and cheese upped a bit, going from 25½c. to 25⅝c. Cocoa made a big jump, from $8.04 to $8.61, but coffee and sugar were unchanged. Canned tomatoes and canned salmon also were steady, but canned peaches rose from $1.80 to $1.87½.

Meat Supplies Larger, Wholesale Prices Dip

OCTOBER SLAUGHTER of cattle under Federal inspection was the highest of any month recorded since inspection began in 1921. While hog marketings were not as high as in October, 1940, they are running at high levels. Lamb and sheep marketings were in good volume, but somewhat lower.

As a result of this supply situation and also, perhaps, because of consumer resistance to recent increases, wholesale meat prices have fallen off somewhat in the last few weeks. Contrary to the supply situation, pork prices fell most, lamb and veal next, with beef showing the smallest drop.

While the demand situation is such that no spectacular falling off in meat prices need be expected, it is likely that the present lower scale for meats will react, at least temporarily, upon the prices of other protein foods.

Record Food Production Expected This Winter

REPORTS by the U. S. Department of Agriculture forecast a record food production in the United States for the winter of 1941-1942. Numbers of cows, hogs, chickens and other livestock on farms, required to produce eggs, dairy products and meat, are at a peak. Also, the harvest just completed has been of bumper proportions, so that ample feed for these animals is available.

Farm production totals for 1941 are expected to include 117,000,000,000 lb. of milk and 3,700,000,000 dozen eggs. Increases called for in 1942 will raise these figures to 125,000,000,000 lb. of milk and 4,000,000,000 dozen eggs. In addition, 1942 is expected to see a record supply of meats, especially pork; of poultry; of vegetables; and of domestic oil seeds, including peanuts and soybeans. Conditions this winter promise to see output well on its way to these new high levels.

INDICATORS

Confectionery and competitive chocolate products sales in September, 1941, totaled $31,210,000 for 204 manufacturers reporting, according to the Department of Commerce. This is an increase of 18 percent over September, 1940, for the same firms.

Flour production in October, 1941, as reported by *The Northwestern Miller* for mills producing 65 percent of United States output, was 6,469,796 bbl., compared to 6,236,857 bbl. in October, 1940.

Oil and oil seed importations into the United States are increasing, with August imports (the last reported) being equivalent to 47,000,000 lb. more oil than last year.

Corn pack this year is now placed at 27,047,845 cases. This is a record and compares to 16,264,049 cases packed in 1940. In addition, 763,681 cases of corn-on-cob were packed, compared to 595,307 cases last year.

Salmon pack in Alaska, revised figures, showed a total of 6,865,463 cases this year, compared to a pack of 5,042,715 cases in 1940.

Canned meat exports in August, 1941, were 17,010,088 lb., compared to 528,399 lb. a year before.

Canned vegetable exports in August, 1941, were 20,899,851 lb., compared to 2,760,367 lb. in August, 1940.

Canned fruit exports in August, 1941, were 2,339,523 lb., compared to 1,238,285 lb. a year before.

Sardine exports in August, 1941, totaled 4,225,002 lb. In August, 1940, sardine exports were 1,868,893 pounds.

Evaporated milk production in September, 1941, was 278,684,000 lb., a record for the month, 42 percent larger than September,

1941, output, and 82 percent above the 1935–1939 September average.

Condensed milk output in September, 1941, was 8,010,000 lb., 21 percent above the production of September, 1940 and 101 percent over the average for September in the past five years.

Dry whole milk production in September, 1941, is reported to have been 70 percent over output in the same month of 1940, while dry skim milk production was 7 percent above the output recorded in September, 1940.

Butter, creamery, produced in September, 1941, was 149,715,000 lb., compared to 146,209,000 lb. in September, 1940, and to a 1930-1939 average of 134,285,000 lb. for September.

Cheese, American, produced in September, 1941, totaled 66,035,000 lb., compared to 53,265,000 lb. in September, 1940, and to a September average for 1930–1939 of 38,797,000 pounds.

Milk sales, fluid, in September, 1941, are reported by Milk Industry Foundation as 6.25 percent above sales in September, 1940.

Dried egg production in September, 1941, was 2,697,269 lb., an increase of 2,407 percent above the 107,576 lb. reported for September, 1940.

Oleomargarine sales in September, 1941, as indicated by sales of internal revenue stamps, totaled 34,345,082 lb., an increase of 26 percent over the 27,227,958 lb. reported last September.

Dried bean crop this year is now estimated at 1,822,600,000 lb., an increase of 68,100,000 lb. over the September 1st estimate and comparing to 1,607,400,000 lb. produced last year.

Grapefruit production estimates for the current crop year now stand at 40,233,000 boxes, compared to 42,974,000 boxes in 1940–1941.

Fruits, frozen, in storage on November 1, 1941, totaled 199,441,000 lb., compared to 163,826,000 lb. on November 1, 1940 and to an average in 1936–1940 of 132,352,000 lb. for the date.

Vegetables, frozen, in storage on November 1, 1941, totaled 97,342,000 lb., compared to 86,047,000 lb. a year earlier.

Butter, creamery, in storage on November 1, 1941, totaled 186,263,000 lb., compared to 105,106,000 lb. on November 1, 1940, and to a November average of 126,494,000 lb. in 1936–1940.

Cheese, all kinds, in storage on November 1, 1941, amounted to 188,916,000 lb., a year before the total was 144,463,000 lb., and the average in 1936–1940 was 124,766,000 lb. for the date.

Eggs, case equivalent, in cold storage on November 1, 1941, totaled 8,246,000 cases. The figure on November 1, 1940, was 7,339,000 cases and the average for November 1 in 1936–1940 was 6,973,000 cases.

Poultry, all kinds, in frozen storage on November 1, 1941, was 128,071,000 lb., compared to 114,257,000 lb. on November 1, 1940, and to an average on November 1 in 1936–1940 of 90,474,000 pounds.

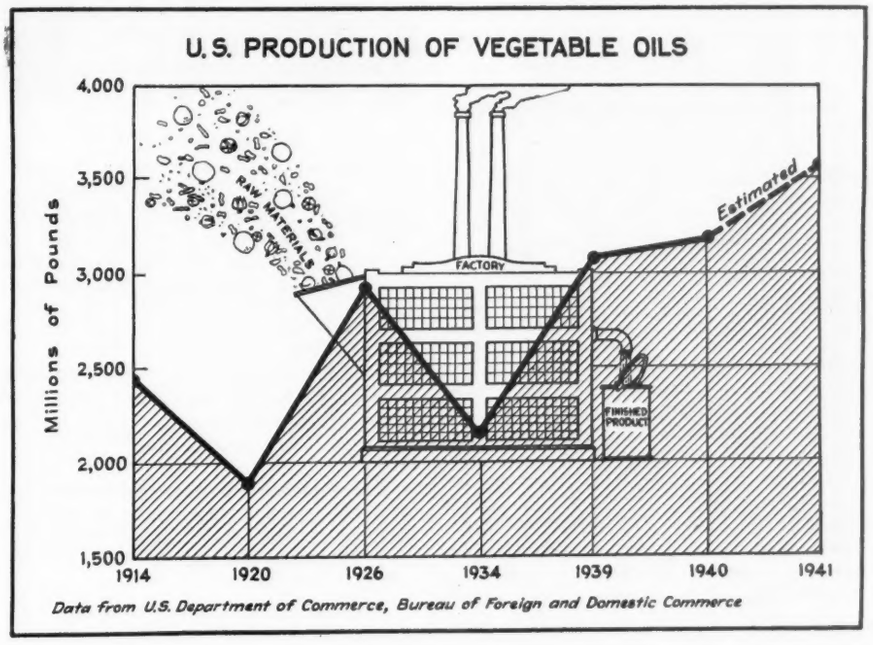
Meat, all kinds, in cure and frozen storage on November 1 of this year totaled 472,171,000 lb. The quantity a year before was 408,836,000 lb., while the November 1st average in 1936–1940 was 407,128,000 pounds.

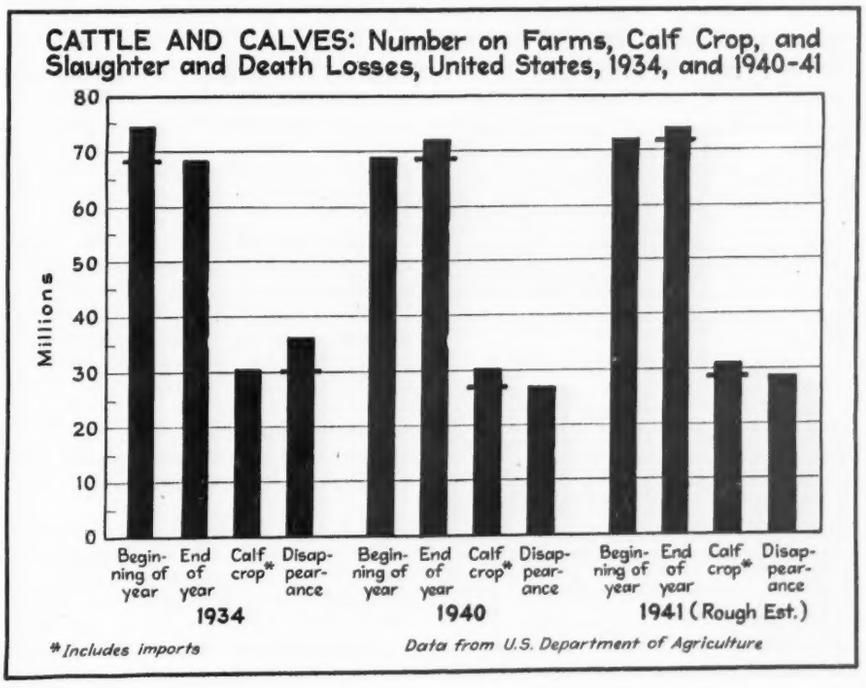
Lard in storage November 1, 1941, was 173,366,000 lb., and rendered pork fat on the same date totaled 3,884,000 lb. The combined figures for these two products on November 1, 1940, was 223,166,000 lb., and the average November 1st figure in 1936–1940 was 98,759,000 pounds.

Weekly wholesale food price index of Dun & Bradstreet stood at $3.31 on November 11, 1941, compared to $2.93 on the corresponding 1940 date.

Business activity index of *Business Week* stood at 159.7 on November 8, 1941, compared to 159.3 one month before and to 140.1 a year before. (This index has been revised since the last issue of FOOD INDUSTRIES, and now includes armament production).

Cost of living index of National Industrial Conference Board was 91.9 in October, 1941, compared to 90.8 in September, 1941, and was 7.5 percent above October, 1940.





MEN · JOBS · COMPANIES

INDUSTRY

Armour & Co. will start production in a new pork canning plant at Omaha, Neb., about Jan. 1. Armour is also rebuilding its 3-story plant at Denison, Ia., for use as an egg-drying plant, and making improvements to its Montgomery, Ala., plant at a cost of $35,000.

Borden Co.'s Chester, S. C., plant will soon be enlarged by the erection of a new $200,000 unit for the manufacture of evaporated milk. The company will also build a milk processing plant in Newberry, S. C., to be completed next spring.

Boston Molasses Co., South Boston, Mass., has placed in operation its new $50,000,000 plant, covering an area of 2 acres and consisting of 11 large steel molasses tanks with a total capacity of 4,000,000 gal., and a steel building 250 x 100 ft., in which the refining and manufacturing of molasses, sirup and sugar products are carried on. In addition, the company has leased a 4-story brick building for warehouse purposes.

British Columbia Packers, Ltd., endorsed by the Priorities branch at Ottawa, is now building a 2-story cannery building, 76 x 213 ft., at its Imperial Cannery, Steveston, B. C.

General Mills Inc., has reopened for "limited operation" its $2,000,000 cereal plant in Buffalo, N. Y., damaged by fire on the eve of opening, Feb. 15, 1940. Machinery and equipment have been installed and eventually the company's entire line of cereals will be processed at the Buffalo plant.

Great Atlantic & Pacific Tea Co. has awarded a contract for the construction of a $700,000 warehouse and distributing center in Baltimore, Md.

Glidden Co., soybean processing firm, is building a soya protein plant containing about 30,000 sq. ft. of working space, near its Chicago, Ill., oil refinery.

Joyce 7-Up Co., Joliet, Ill., will distribute $200,000 among its 400 employees in Illinois, Wisconsin and New York as additional compensation with Christmas paychecks.

Land O'Lakes Creameries, Inc., will build a 2-story milk dehydration plant costing $150,000 in Milaca, Minn., and a $250,000 milk plant at Whitehall, Wis.

Francis T. Leggett & Co. will construct a $50,000 1-story brick and concrete warehouse as an addition to its Pittsburgh, Pa., plant.

Midwest Frozen Egg Corp., Chicago, will establish a new plant to freeze and dehydrate eggs in Indianapolis, Ind. The bulk of the dehydrated egg production will be sent to Britain under the Lease-Lend Act, and the remaining production will go into regular consumer channels.

ROBERT C. HAVEN

R. C. Haven, Continental Baking Co., New York, heads the Food Section executive committee of National Safety Council, 1941-1942. Vice-chairman is H. B. Taylor of Northwestern Yeast Co., and secretary is Roy L. Rollins, A. E. Staley Manufacturing Co.

ROBERT F. WILSON

R. F. Wilson, associated with AGMA as assistant to Paul S. Willis, president, has resigned to become chief of the food processing equipment section of OPM, with headquarters in Washington. Mr. Wilson formerly served as counsel for the food products division of NRA.

John Morrell Co. plans to construct a $300,000 plant for canning meat products in Ottumwa, Ia. The plant will be a 2-story and basement brick and concrete structure.

National Biscuit Co., McKay Food Division, plans to build a 2-story manufacturing plant, 120 x 135 ft., at a cost of $150,000, in Battle Creek, Mich.

Olive Oil Association of America, Inc., has announced the renewal of the Charles A. Tosi Award of $500 to the person or institution making an outstanding and practical scientific contribution to the knowledge of olive oil and its uses.

Quaker Oats Co., Chicago, has adapted its explosion process to the production of dehydrated pureed soups, to be known as "Mother's Soups." The products, which are packaged in powdered form in tightly sealed cartons with a shaker top, are now being tested in undisclosed markets.

S. & W. Fine Foods, Inc., will erect a $50,000 steel and concrete addition to its warehouse in Redwood City, Calif.

Saint Clair Foods Co. has chosen McAllen, Tex., as the site for the erection of its new citrus products processing plant, estimated to cost $50,000.

Sheffield Farms, Inc., suffered loss of $60,000 when fire of undetermined origin destroyed its Hobart, N. Y., plant on Nov. 11. It was the third creamery and dairy products plant fire in the area within a week.

Swift & Co. has made available a limited number of fellowships to universities and medical schools for research in nutrition, to promote scientific study of the problems of American diet. The fellowship program will be coordinated by R. C. Newton, vice-president in charge of the Swift laboratories.

PERSONNEL

Wilton L. Adams, vice-president of Howard Grain Co., a division of General Mills, Inc., is head of the company's newest branch at Miami, Fla.

Robert S. Breed, head of the department of bacteriology, New York State Agricultural Experiment Station, has been granted a leave of absence to conduct a survey in South America for the Inter-American Dairy Industry Committee.

C. R. Burdick, manager of the Fremont County Co-op Creamery at Hudson, Wyo., has accepted a position as manager of the newly organized Billings Creamery at Billings, Mont.

A. H. Court has leased the Howey Canning plant at Eustis, Fla., and will install machinery and equipment at a cost of $30,000 to complete the largest byproducts plant in the Florida citrus industry.

Edwin K. Daly, executive vice-president and director of Horn & Hardart Baking Co., has become president following the death of Joseph V. Horn. Mr. Daly also becomes president of the Horn & Hardart Co. of New York.

Carl B. Gibson, formerly with General Mills, Inc., in the family flour and packaged foods division at Kansas City, has joined the sales department at Valier & Spies Milling Co., St. Louis.

Charles G. Goundry has been appointed Buffalo division manager of Pillsbury Flour Mills Co., succeeding J. Jerome Thompson, who has been transferred to Minneapolis as co-manager of the Northwest Division.

C. Fred Gurnham, formerly on the chemical engineering faculty of Pratt Institute, is now associated with the firm of Fred S. Carver, manufacturer of hydraulic equipment, where he will conduct research on several new applications of hydraulic pressing in the field of vegetable fats and oils.

W. T. Hanks, formerly with Technical Institute, Independent Biscuit Manufacturers' Co., has gone with Schulze-Burch Biscuit Co., Chicago, to install a chemical laboratory and develop a program of technical control over production.

Martin H. Ittner, Colgate-Palmolive-Peet Co., has been elected to receive the Perkin Medal of the Society of Chemical Industry for 1942. Among other accomplishments, Dr. Ittner developed a successful commercial process for the hydrogenation of fatty oils.

Earle S. Koehl has purchased Bonita Preserving Co., Miami, Fla., from Johann Peterson, and will double plant capacity to broaden distribution of its products.

W. C. Launder has become general manager of the plant of R. U. Delapenha, Brooklyn, N. Y.

WILBUR G. CARLSON

Kraft Cheese Co. has announced appointment of Wilbur G. Carlson as director of the Public Relations department, with headquarters in Chicago. Mr. Carlson is secretary of Corn and Asparagus Canners' Service Bureaus, and for the present will continue in that capacity.

E. A. Meyer recently resigned as vice-president and sales manager of C. H. Musselman Co., canning firm, to become consultant on canned foods in the Food Supply branch, Purchase division, OPM.

Don S. Morgan, John C. Morgan Co., Traverse City, Mich., is 1942 president of Michigan Canners' Association. Vice-president is Robert Payne of Eau Claire Packing Co., and secretary-treasurer is William Kinnaid, Northern Processing Co.

P. Percy Noble, formerly division sales manager of Quaker Oats Co. in Canada, has been appointed western sales manager.

Lee Shipman, formerly of American Maize Products Co. has resigned to become associated with General Foods Corp., Central Laboratories, Hoboken, N. J.

Kenneth Wallace, Cleveland, has been elected president of National Association of Retail Ice Cream Manufacturers.

Lee A. Wheeler, Lake Wales, Fla., has been elected president of Florida Canners Association. H. W. Nelson of Tampa is first vice-president.

H. Ferris White, Jr., former manager of Burry Biscuit's Chicago plant, heads Whiteway Bakeries, Inc., new manufacturing company of Chicago.

DEATHS

Burdette Boyes, 65, manager of Seward City Mills, Seward, Neb., Oct. 21, in Lincoln, Neb.

William Arthur Cablish, 74, one of the founders of Cablish Baking Co., Oct. 17, in Charleston, W. Va.

Amariah G. Cox, 92, formerly vice-president and treasurer of William Wrigley, Jr., Co., Oct. 15, in Chicago.

Horatio Craig, 70, founder of D. S. & H. Craig, Philadelphia rice merchants, Nov. 5, in White Plains, N. Y.

Orrin S. Goan, 82, retired production manager of National Biscuit Co., Oct. 28, in Carmel, Calif.

Joseph V. Horn, 80, founder and president of Horn & Hardart Baking Co. of Philadelphia and president of that company in New York, Oct. 13, in Philadelphia. With the late Frank Hardart he established the first "Automat" in America.

W. L. Watson, 77, a pioneer in the flour milling industry, Oct. 23, in Ashland, Ky.

Frank W. Wilkisson, 62, president of Frank W. Wilkisson, Inc., Fulton Fish Market firm, president of Fishery Council, Inc., national trade organization, and of

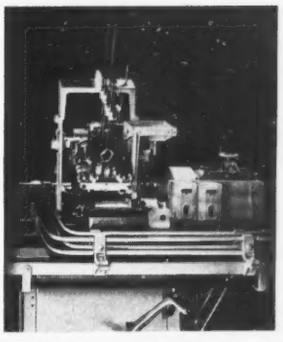
AUTOMATIC or SEMI-AUTOMATIC

You get the

BEST LABELING

in the

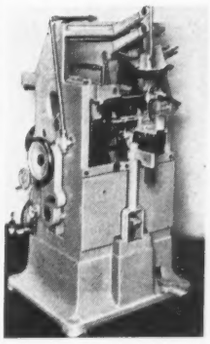
WORLD



The WORLD Automatic UNI-TURRET Labeler provides high quality, low cost, full automatic labeling of round shaped (smooth, fluted or fancy) containers. The *Uni-Turret* is particularly suited for this kind of labeling because it is equipped with a patented sliding picker mechanism that permits gumming of the entire label surface or any portion of it.

There are *Twin-Turret* and *Triple-Turret* Models of this new WORLD Labeler available for those requiring higher production and continuous labeling.

The WORLD Model CH Semi-Automatic Labeler solves a large variety of labeling problems. Versatile, compact, easy to operate, this Upright Model CH Labeler applies single labels from postage stamp size up to 6" x 6" to every size and shape container from vials up to and including gallon size bottles and jugs.



See these WORLD LABELERS at the

CHEMICAL SHOW

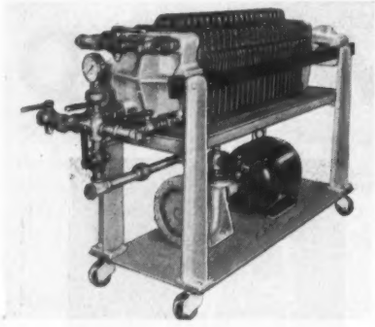
Booth Nos. 545-546

ECONOMIC MACHINERY CO.

WORCESTER, MASSACHUSETTS

Who Says You Can't Use FILTRATION?

In the face of increased demand, consider the many ways in which Shriver Filter Presses improve quality, increase output, cut costs or recover wastes in the food industries.



Portable stainless steel unit for filtration and decolorizing of products that require a high degree of purity and sanitation.

CLARIFYING

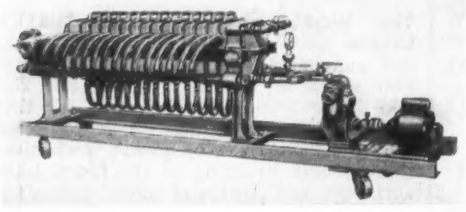
cider and vinegar, extracts, syrups, edible oils, wine, distilled liquors and a host of other food products whose keeping and selling qualities depend on brilliant clarity of finished product.

RECOVERING OR REGENERATING

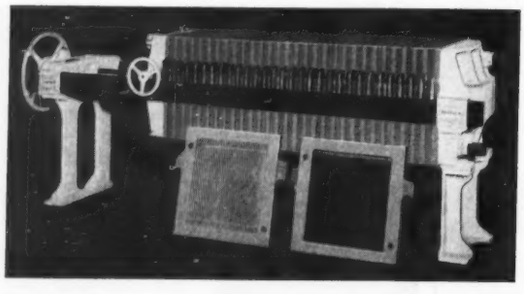
sugar from scrap candy, cooking fats, preserving syrups and many other wastes or by-products of food processing.

CUTTING OVERALL PROCESSING COSTS

by making possible the use of low grade sugars; by supplying thickened materials direct to dryers and eliminating extra handling operations and needless evaporating costs; by speeding up production through speedy filtration in place of slow settling methods or ineffective filtering devices and by many other specific applications to special processing problems.



Steam jacketed filtration unit for clarifying thick or viscous materials at temperatures above normal. Can also be used for chill-proofing.



Rubber filter press for cider, vinegar and other products that must avoid metal corrosion.

There may be a profitable use for filtration equipment in your plant. Let us discuss this possibility with you and carry on any necessary tests without charge to you in the Shriver Laboratory. Tell us what you make and we will show you where and how a Shriver Filter Press can improve quality and cut costs. And in the meanwhile, ask for Bulletin No. 110. T. Shriver & Company, 860 Hamilton Street, Harrison, N. J.

Visit Booth No. 12 at the Chemical Show

FOR BETTER QUALITY

Shriver FILTERS

RECOVER SOLIDS · CLARIFY · DECOLORIZE

GEORGE R. WEBBER

George R. Webber, 51, manager of the package development department of Standard Brands, Inc., and recently elected president of the Packaging Institute, died on Nov. 1 in New York Hospital after a brief illness.

Producers Fish Co., Gloucester, Mass., Nov. 11, in Brooklyn, N. Y.

Leroy C. Wood, 53, president and founder of the Ideal Dairy Co., Oct. 25, in Allentown, Pa.

ASSOCIATED INDUSTRIES

Aluminum Co. of America is constructing an additional blooming mill at its Massena, N. Y., works, to cover an area of 450,000 sq. ft., at a cost of $150,000,000. This expansion is over and above the company's present $200,000,000 defense program.

Continental Can Co. plans construction of a $1,500,000 new factory, 1- and 2-story, 400 x 1000 ft, in Chicago.

Merck & Co., Inc., Rahway, N. J., announces the opening of a new analytical laboratory containing equipment and facilities for controlling the quality of more than 1,500 Merck products.

Monsanto Chemical Co. has opened a newly constructed baking laboratory to be devoted to research and technical service in scientific baking. Standard home and commercial mixers are part of its equipment.

Owens-Illinois Can Co. has begun operation of its new 3-story building in Chicago, adding 176,000 sq. ft. of floor space to its plant in that city. The structure is light-conditioned, sound-conditioned and fireproofed.

Reynolds Metals Co. is drawing up plans for a third aluminum plant to be located at Listerhill, Ala., expected to increase its aluminum production to 160,000,000 lb. a year.

NEW PACKAGES & PRODUCTS

Packaged Natural Cheese

FOUR YEARS AGO the Wisconsin Department of Agriculture, headed by Ralph E. Ammon, began an effort to improve the merchandising of natural cheese, to meet the competition of more attractively packaged processed cheese.

In cooperation with Goodyear Rubber Co., the department began experiments to secure an airtight, moisture-proof package which would keep the cheese fresh and permit proper curing. As a result, natural Wisconsin Swiss and natural Wisconsin American cheese are now cut to 1-lb. size and packaged in a transparent rubber hydrochloride wrapper. The cheese is hermetically sealed in the wrapper, yet any gases which form in curing escape through the wrapper. Each pound of cheese is hand-wrapped, first in 40-gage and then in 120-gage rubber hydrochloride bearing the trade label. A heat-pressure machine completes the closure.

Cheese Producers Marketing Association, Monticello, Wis., is marketing a 2-lb. holiday package of the cheese.

High-Protein Flour

EDIBLE PEANUT FLOUR, marketed under the trade name "PDP" (powdered defatted peanuts), has been developed by Traders Oil Mill Co., Fort Worth, Tex., in collaboration with the Surplus Marketing Administration. The peanut flour, reported to have fine nutritional properties and palatability, analyzes approximately 60 percent protein, 8 percent fat and 6 percent moisture. Its proteins, among other amino acids, contain eight of the ten dietary essential amino acids.

Pending further research and completion of marketing plans, Traders Oil Mill Co. is limiting sales of PDP to wholesale manufacturers, some of whom are buying PDP in bulk and repackaging it under various trade names.

Broiled Mushrooms

BROILED-IN-BUTTER MUSHROOMS are now packed in a can and distributed by Jacob Mushroom Division, Grocery Products Mfg. Corp., West Chester, Pa. From beds of fresh, ripe mushrooms only those with open veils, similar to fresh mushrooms on the market, are chosen for broiling. After the caps are sorted and filled with creamery butter, the mushrooms are broiled under a blue flame.

Buttered, broiled and packed in 6-oz. cans within a few hours of picking, "B in B Mushrooms" are ready to be heated and served as they come from the can. One can serves three or four persons and is equal in amount to about 1 lb. of fresh mushrooms.

"T. A."—A New Milk Drink

WALKER-GORDON LABORATORIES, Plainsboro, N. J., Borden Co. subsidiary, is introducing "T. A.", a new vitamin-enriched blend of tomato juice and acidophilus milk. T. A. retains the virtues of regular acidophilus milk (which contains between 500 million and a billion lactobacilli acidophilus per cubic centimeter) plus enough quantities of vitamins A, B_1, C and D to supply a normal daily requirement. The drink is distributed in regular Walker-Gordon bottles.

Ready To Bake

AFTER ALMOST TWO YEARS of research, the nutritionists of Cramer Products Co., New York, have introduced seven types of fully prepared "Joy" brand mixes for cakes and muffins. Dry ingredients for the preparation of golden layer cake, chocolate-flavored cake, lemon cup cakes, orange cup cakes, corn cake, cheese muffins and whole wheat muffins are packaged in transparent cellulose, ready to be baked with the addition of milk or water.

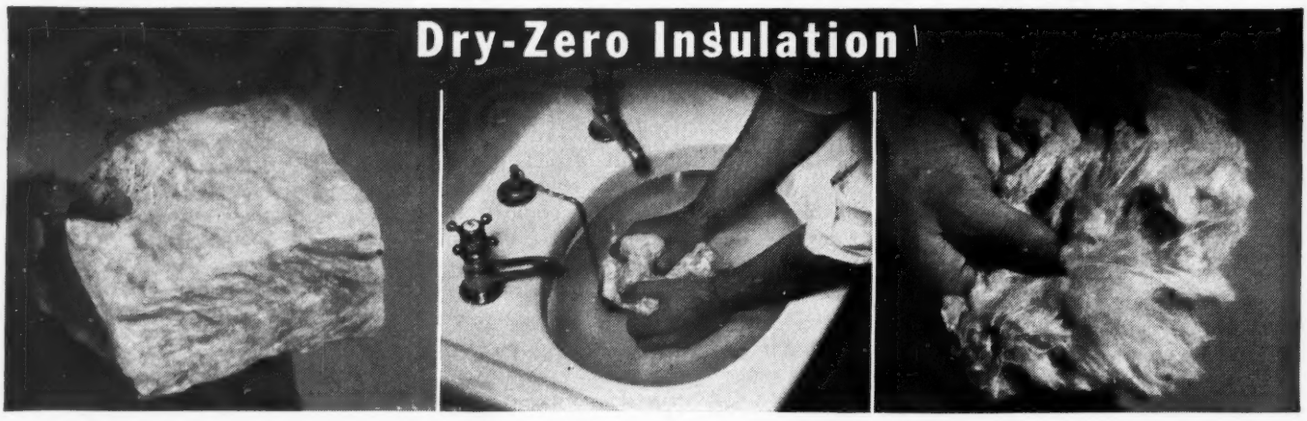
Is your Truck Insulation *really* WATER-REPELLENT?

This simple "10-SECOND TEST" will tell you . .

1 BEFORE TEST Take a batt of any other fibre insulation that has or has not been "waterproofed" with a heavy coating of oil or wax.

2 SQUEEZED UNDER WATER Squeeze it under water 10 or 12 times, as you would a sponge. Then take it out and try to remove the excess water by shaking it.

3 SOGGY—INEFFICIENT Notice how heavy it has become. Pull it apart and see how wet it is inside. The "waterproofed" insulation is thoroughly soaked.



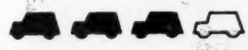
1 BEFORE TEST Now, make exactly the same test on a batt of Dry-Zero Insulation. Notice the dry, fluffy fibres, which are by nature water-repellent.

2 SQUEEZED UNDER WATER Plunge the Dry-Zero into a pan of water and treat it exactly as you did the other batt. Remove it from the water and shake it.

3 PERFECTLY DRY INSIDE Pull it open. Though damp outside, the Dry-Zero is perfectly dry inside—still fluffy—still retaining its high thermal efficiency.

Only a Water-Repellent Insulation Retains its Heat-Stopping Efficiency

Moisture—in the form of water vapor—penetrates into your truck body walls, even in the driest weather. Hitting the cold inside, it condenses into drops of water on your insulation. Ordinary insulation will absorb the water and become soggy—losing its heat-stopping efficiency. But not Dry-Zero! It is by nature water-repellent and sheds water like a duck. Properly installed, it retains its high thermal efficiency ("k" factor of 0.24 by test). In addition, Dry-Zero weighs only 1/7 as much as commercial corkboard and is remarkably free from settling, rotting, or disintegration. Write for new bulletin, Dry-Zero Corp., 222 N. Bank Drive, Chicago; or 60 E. 42nd St., New York, N. Y.



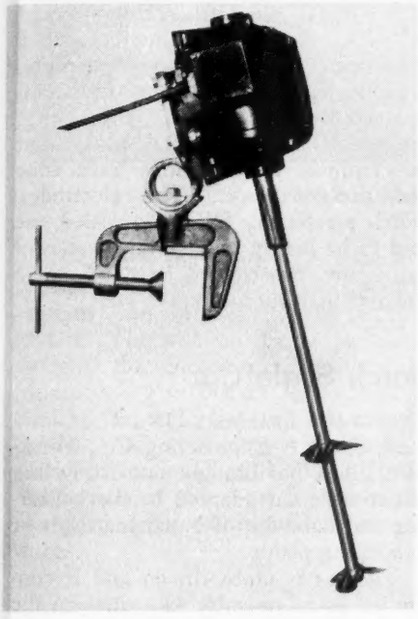
3 OUT OF EVERY 4 INSULATED TRUCKS USE

DRY·ZERO Insulation

FOOD EQUIPMENT NEWS

Mixer and Mixing Unit

ALSOP ENGINEERING CORP., Milldale, Conn., has brought out a new line of "Hy-Speed" mixers and mixing units. The mixers come in sizes from ¼ to 5 hp. and are of the portable type for fastening to the upper edge of the container. A swivel type clamp permits flexibility in positioning the mixer propellers in any part of the container.



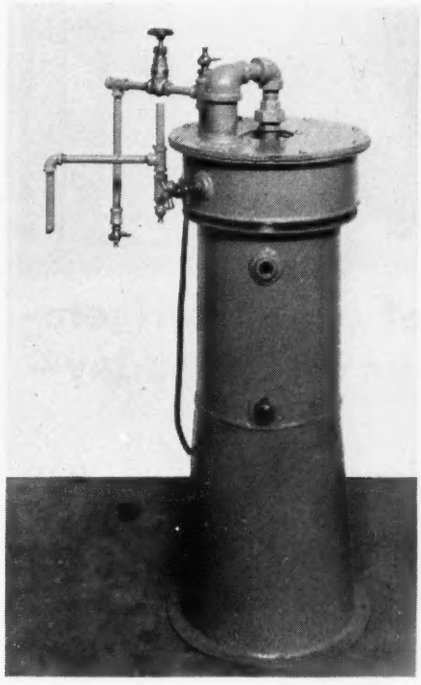
New line of portable mixers come in ¼ to 5 hp. sizes.

These new mixers are supplied with Alsop's glass-lined tanks in a variety of sizes to provide complete mixing units.

Bundling Machine

PACKAGE MACHINERY CO., Springfield, Mass., has brought out its Model F-10 for bundling large-sized packages. This machine is quickly adjustable for various sizes and will produce bundles within the following dimensions: 20 in. to 7½ in. in length; 13¼ to 6 in. in width; and 9 in. to 4 in. in height. Packages may be bundled in lots of any number coming within the size range of the machine.

Kraft or other strong paper which makes up the overall wrapper, is fed from a roll and automatically cut to size by the machine. Separate end labels, in sheet form, are sealed on both ends of the bundle by glue. The finished bundle is then discharged between moving belts which hold the folds and labels until the glue has set.



Solvent vaporizer for use in such processes as distilling oils.

The speed range of this new model is eight to twenty-four bundles per minute depending upon the size of the bundle, the arrangement of the packages being bundled and the speed at which the operator can feed the machine. The machine is equipped with automatic trip so that it will not feed paper or labels unless packages are in position to be wrapped. Adjustments for bundle size are made by hand wheels as also are changes in speed.

Solvent Vaporizer

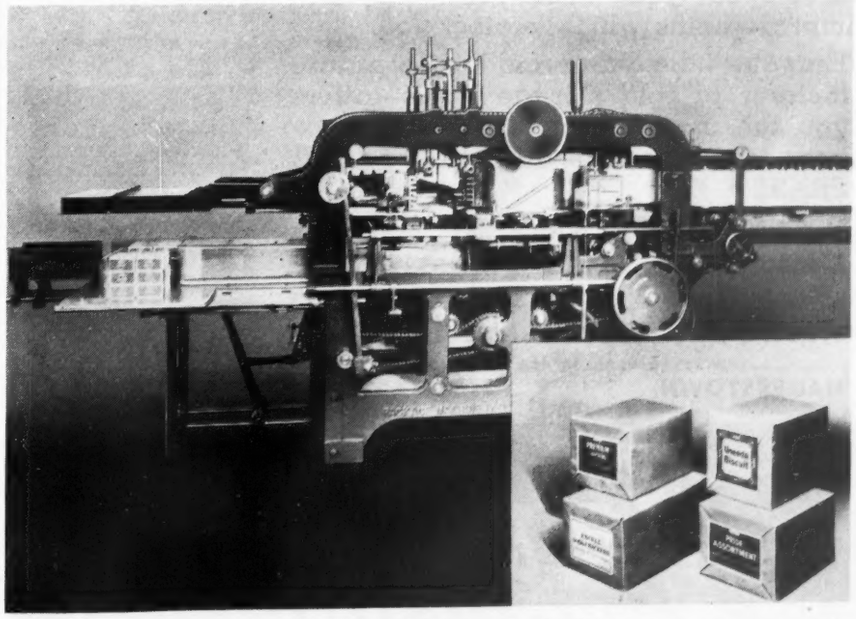
A "STRIPPER" or solvent vaporizer (patent pending), operating on the steam distillation principle and designed for use with the Stokes rotary high vacuum pump, has been developed by F. J. Stokes Machine Co., Philadelphia, Pa. This device is a compact unit, mounted alongside the vacuum pump, through which the pump sealing oil is passed before it is returned to the oil reservoir.

The vaporizer is designed continuously to remove low-boiling-point solvents and other volatiles, such as are encountered in distilling essential oils, which may have dissolved in the pump oil. Thus it is possible for the pump in solvent applications to maintain effectively the high vacuum that is necessary for efficient processing.

Solvents removed by the vaporizer can be recovered if desired.

pH Indicator

LEEDS & NORTHRUP CO., 4934 Stenton Ave., Philadelphia, Pa., has brought out



New bundling machine for large-sized packages is quickly adjustable to various sizes of bundles.

At every doorway—of every refrigerated room—every hour of every day—THE BATTLE IS ON.

To protect your goods—your profits—and your reputation—your doors must resist

HEAT

MOISTURE and

MOLD

which mean deterioration of your stored products.

Only one door manufacturer has devoted to this problem ALL of his attention for fifty years past. Only one has developed, year after year, the new improvements which protect you.

That one—the oldest and largest manufacturer of cold storage doors—offers you the most complete protection experience can create, and at NO EXTRA PRICE.

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JAMISON COLD STORAGE DOOR CO.

Jamison, Stevenson and Victor Doors

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JAMISON STANDARD DOOR DESCRIBED IN BULLETIN 122. The choice of "those who know" for average refrigerated rooms. For busiest doorways, use our Vestibule Door (Bulletin 127); with overhead track, our Track Port Door (Bulletin 124); for lowest temperatures, our Super-Freezer Door (Bulletin 126); for moving goods by conveyor belt, our Can & Crate-Passing Vestibule.
There is a proved efficient, Jamison-built Cold Storage Door for every need.

JAMISON-BUILT COLD STORAGE DOORS

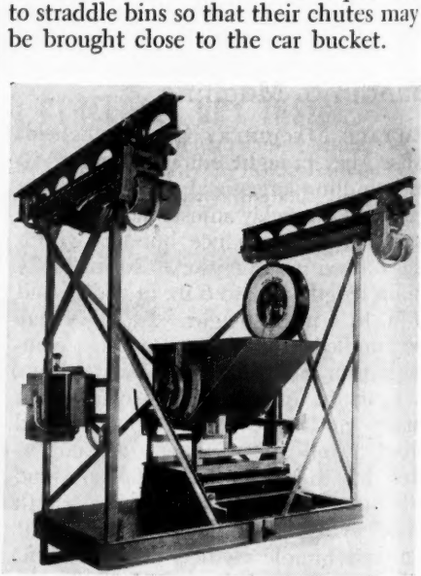
a new model of glass-electrode pH indicator. The manufacturer states that this instrument, though simplified and stripped to essentials for low cost and easy operation, offers as much accuracy as is needed in many laboratory measurements and in practically all plant tests. It is designed to retain full accuracy up to 85 deg. F. in atmospheres of 95 percent relative humidity. Measurement can be made with it consistently within the limit of error of adjustment, plus or minus 0.1 pH. The instrument is light in weight and easy of adjustment. Measurements are made simply by pouring a sample into the self-contained beaker in the instrument and reading the pH directly from the meter scale.

Adequately shielded, the instrument embodies a deflection meter and a thermionic amplifier of high stability. A manually operated temperature compensator (0 to 50 deg. C., with 1 deg. divisions) is included in the instrument to eliminate computations, save time and prevent errors. The electrodes, which are factory filled and sealed, are said to be highly stable. The case is of mahogany, constructed to stand severe use and high humidity.

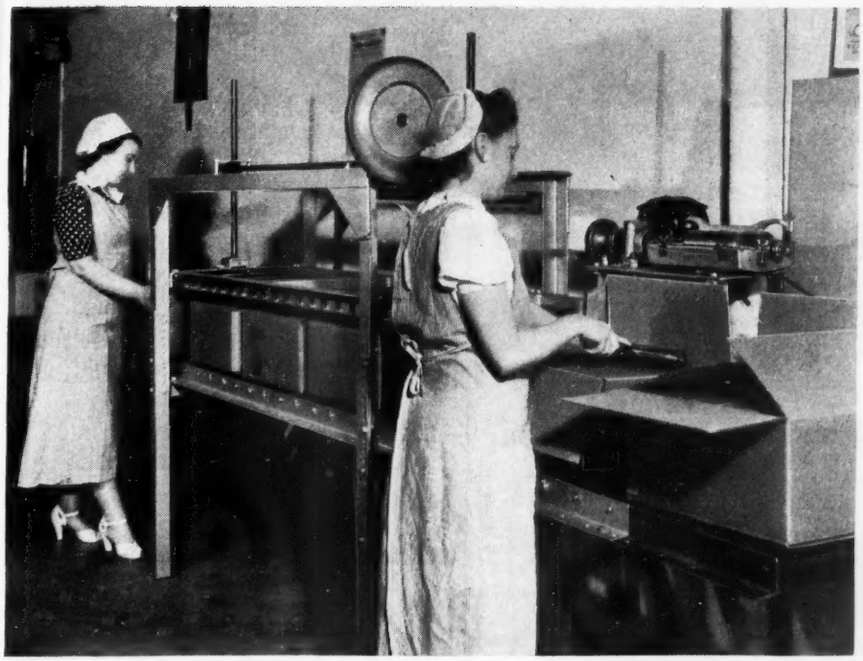
Batch Scale Car

Cleveland Tramrail Div., The Cleveland Crane & Engineering Co., Wickliffe, Ohio, has brought out a traveling batch scale car adapted to the collecting and handling of batch materials in processing plants.

The car is motor-driven and is controlled by an operator who rides on the platform space provided at the left of the bucket. A variable speed drum controller permits the car to be operated at any speed up to 300 ft. per minute. Double overhead rails make it possible to straddle bins so that their chutes may be brought close to the car bucket.



Traveling batch scale car.



The "Fast and Sure" carton sealer in operation.

It is said that with this unit it is possible to gather exact amounts from various bins in order to make up a batch. The scale on the car accurately weighs the ingredients as they are dumped. The bucket is emptied by tilting, through the use of a crank wheel. While the unit illustrated is designed for handling batches of ½-ton, other sizes of these batch cars can be provided to meet individual requirements.

Centrifugal Separators

THE REINEVELD CORP., formerly of 20 Exchange Place, New York, announces that it has moved its headquarters to 4655 Stenton Ave., Philadelphia. It will there be affiliated with Welding Engineers, Inc., who will manufacture the Reineveld line of centrifugal separators and filters, formerly made in Delft, Holland.

Two machines will be manufactured immediately, a 65 in. diameter for production purposes, and a 24 in. diameter for laboratory and small scale work. Other sizes will be later added to the line.

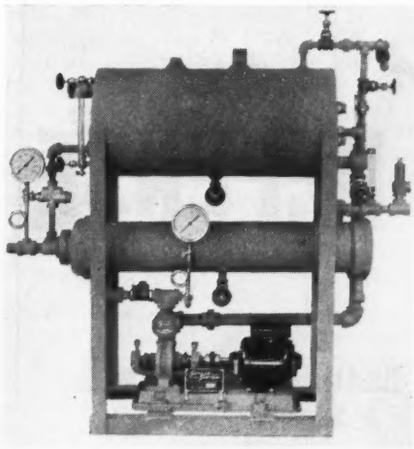
Carton Sealer

FELTON & SON, INC., 520 East 2nd St., South Boston, Mass., has brought out the "Fast and Sure" carton sealer, a machine with a capacity of four or more sealed cartons per minute. This unit takes any size of shipping case from 2 in. to 20 in. in height and from 6 in. to 20 in. in width. It is equipped with a compression conveyor having all-steel rollers 24 in. long and 2 in. in diameter, spaced 4 in. on centers. Drive is from a ¼ hp. motor with extension plug. This drive operates the gluing unit and also operates the single rubber-covered friction roller in the lower tier of rollers. The device is portable, having locked casters. Overall dimensions are 10 ft. in length, 6 ft. in height and 32 in. in width. Weight is 550 lb.

Special features claimed for this machine are high production with the requirement of only one attendant.

Condensate Return System

FRED H. SCHAUB ENGINEERING CO., 325 W. Huron St., Chicago, has recently introduced the "Junior Model" trapless system for use in recovering condensate and returning it to boiler feed in small processing plants. This system is suited to operating with boilers of



"Junior Model" trapless return system for processing plants.

EXTRA

NEW MODEL FLUOROPHOTOMETER NOW AVAILABLE

Many Improvements Lower in Cost

Pfaltz & Bauer, Inc., pioneer developers of photo-electric research and control instrument again lead the way with the new Model "C" Fluorophotometer. This new model incorporates many advance features, the result of careful study and collaboration with many of the most important research and control laboratories in the country. Be sure to investigate this modern instrument—it is built for the most rigid requirements of today—and tomorrow!

Check these features!

- All parts (except the illuminating device) contained in a single unit.
- Simple electrical circuit wiring—trouble free, *no stabilizer or amplifier required.*
- Comparison of sample directly with blank is easily accomplished with the aid of sliding carriage containing both known and unknown solutions.
- Universal application in fields of fluorometry, colorimetry and turbidimetry.
- Can be used with wave lengths of narrow bands over the complete range of the spectrum from 3000 to 7000 A.
- Maximum active surface with minimum quantity of test material.
- No heating effect.
- Absorption cuvettes or test tubes may be used.
- Automatic shutter protects galvonometer—prevents fading of the sample as well as fatigue and heating effect on photo-cells.
- Sensitive galvanometer with short period.

Write today for full information

NOTE: We solicit inquiries relative to various vitamin and biological determination. Our trained technicians will give your request prompt and careful attention.

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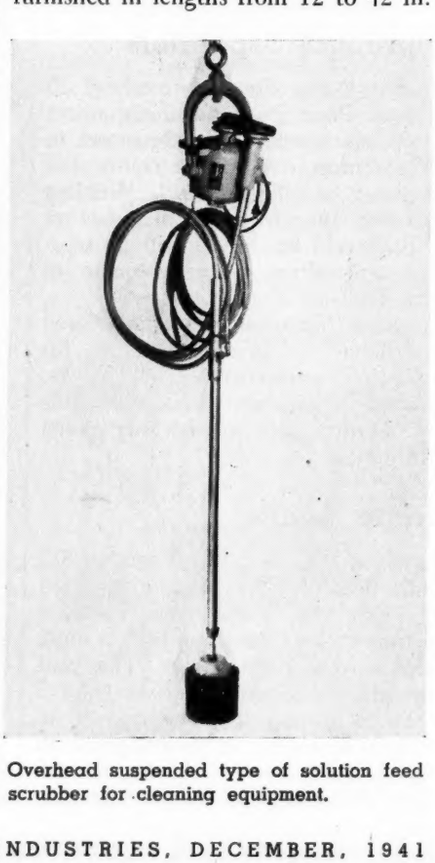
from 1 to 10 boiler horsepower capacity. A feature is that it can be installed in a one-story plant on the same level with the machine, as the return line may be run overhead or otherwise in order not to necessitate changes in existing piping arrangements. Advantages are said to be that the return system assures higher machine temperatures, faster production, higher feed water temperature and fuel economy together with automatic boiler feed water regulation. In general, this Junior Model incorporates all the engineering features of the Schaub trapless heat reclaiming system built for larger plants.

Solution Feed Scrubber

FOR CLEANING KETTLES, pasteurizers and other food equipment, National Electric Manufacturers Co., 60 E. 42nd St., New York City, has brought out Model KFV suspended type solution feed scrubber.

This scrubber can be mounted on an overhead trolley in order to serve a number of units. The cleaning solution is fed by gravity from an overhead container. It is possible for the operator to scrub completely kettles or tanks to a depth of 6 ft., the flow of solution being controlled by a valve at the operator's end of the scrubber handle.

These scrubbers are built in sizes from ⅛ to 3 hp. with 15 ft. of rubber-covered flexible shaft and adaptor to take various sizes and types of solution feed brushes. Scrubbing handles are furnished in lengths from 12 to 42 in.



Overhead suspended type of solution feed scrubber for cleaning equipment.

JUST OFF THE PRESS

BOOKLETS • LITERATURE • BULLETINS

FOOD PLANT EQUIPMENT

Dairy Products Machinery – Processing equipment, testing and control apparatus and supplies for plants handling liquid milk products, ice cream, condensed milk, evaporated milk, powdered milk, cream and cheese, are described with specifications in illustrated catalog "E," a 410-page general catalog of Mojonnier Bros. Co., 4601 W. Ohio St., Chicago.

Material Handling–"Facts about Towmotor" is an illustrated catalog describing and giving operating data for various types of the Model LT industrial trucks, issued by Towmotor Co., 1226 E. 152nd St., Cleveland, Ohio.

Mixing Equipment–Abbé-Lenart "Change-Can" mixers, vertical devices for effecting uniform and rapid mixing of liquids, semi-fluids and thick materials, in capacities from 5 to 165 gal., are described in two-page bulletin No. 53 issued by Abbé Engineering Co., 50 Church St., New York.

Refrigeration and Air Conditioning–"Heat Disposal" is the title of a 12-page booklet describing evaporative condensers and their use in refrigeration, air conditioning and liquid cooling, issued by Carrier Corp., Syracuse, N. Y.

PLANT SUPPLIES

Cleaning Equipment – The "Hy-Pressure Jenny," a steam cleaner for equipment and buildings, is described with specifications in an eight-page illustrated catalog recently issued by Homestead Valve Mfg Co. Coraopolis, Pa.

Electric Hoists–Hoists especially designed for the meat packing industry, in sizes from ¼ ton to 2,000 lb. capacity, are described with installation data in Bulletin AB900, Hoist and Crane Div., Robbins & Myers, Inc., Springfield, Ohio.

Factory Equipment–A 40-page illustrated catalog of factory equipment such as work benches, stools, cabinets and other products has been issued as Catalog No. 331-D by Lyon Metal Products, Inc., 3041 Clark St., Aurora, Ill.

Flooring–"New Ideas in Functional Floor Design" is the title of a 12-page illustrated bulletin on the uses and properties of open steel grating for floors, stair treads, walkways, and other construction, published by Open Steel Flooring Institute Inc., American Bank Bldg., Pittsburgh, Pa.

Gears–The use of Synthane Bakelite-laminated material in silent, stabilized gears is the subject of a folder issued by Synthane Corp., Oaks, Pa.

CONTROL EQUIPMENT

Control Equipment–"Strip-Chart" recording instruments for the control of temperature, pressure, liquid level, flow, feed and other factors are described in 16-page Bulletin No. 570, The Bristol Co., Waterbury, Conn.

Control Equipment–Data and descriptions of various types of pyrometers and thermocouples used in temperature and other controls are contained in Bulletin No. S-2-3, a thermocouple data book and catalog issued by Wheelco Instruments Co., Harrison and Peoria Sts., Chicago.

Control Instruments – Air operated controllers for temperature, pressure, flow, liquid level and humidity are described and illustrated by photographs and schematic diagrams in 36-page Catalog No. 8903 of Brown Instrument Co., Wayne and Roberts Ave., Philadelphia, Pa.

Feedwater Control–"The Removal of Dissolve Gases from Boiler Feedwater" by Arthur E. Kittredge, is the title of Reprint No. 16, issued by Cochrane Corp., 17th St. and Allegheny Ave., Philadelphia, Pa.

Oven Temperature Controls – Automatic electric-type temperature controllers for ovens, all types of fuel and electric heating, for temperatures up to 1,000 deg. F., are described in illustrated Bulletin No. 579, the Bristol Co., Waterbury, Conn.

pH Control – "What Every Executive Should Know about pH," is the title of an informative 10-page booklet telling what pH is, how it is controlled, and describing the Beckman pH instruments, issued by National Technical Laboratories, So. Pasadena, Calif.

Remote Controllers – Instruments employing vacuum tubes for the remote control of flow, pressure, level and other processing variables are described in Bulletin J 2-3, put out by Wheelco Instruments Co., 1929 So. Halsted St., Chicago.

Time Cycle Controllers–For general process control and for coordinated control work, time cycle controllers are described, with uses illustrated by drawings, in Catalog No. 572, The Bristol Co., Waterbury, Conn.

LABORATORY EQUIPMENT

Laboratory Equipment – Polarizing microscopes, used in the analysis of crystalline materials and such materials as starch and fiber, are fully described in a recent 25-page illustrated bulletin of Spencer Lens Co., Buffalo, N. Y.

Polarimeters–Polarimeters for use in production control and laboratory operation, particularly in connection with the manufacture of sugar, sugar products and sugar-containing products, are described in two recent bulletins of Spencer Lens Co., Buffalo, N. Y.

MISCELLANEOUS

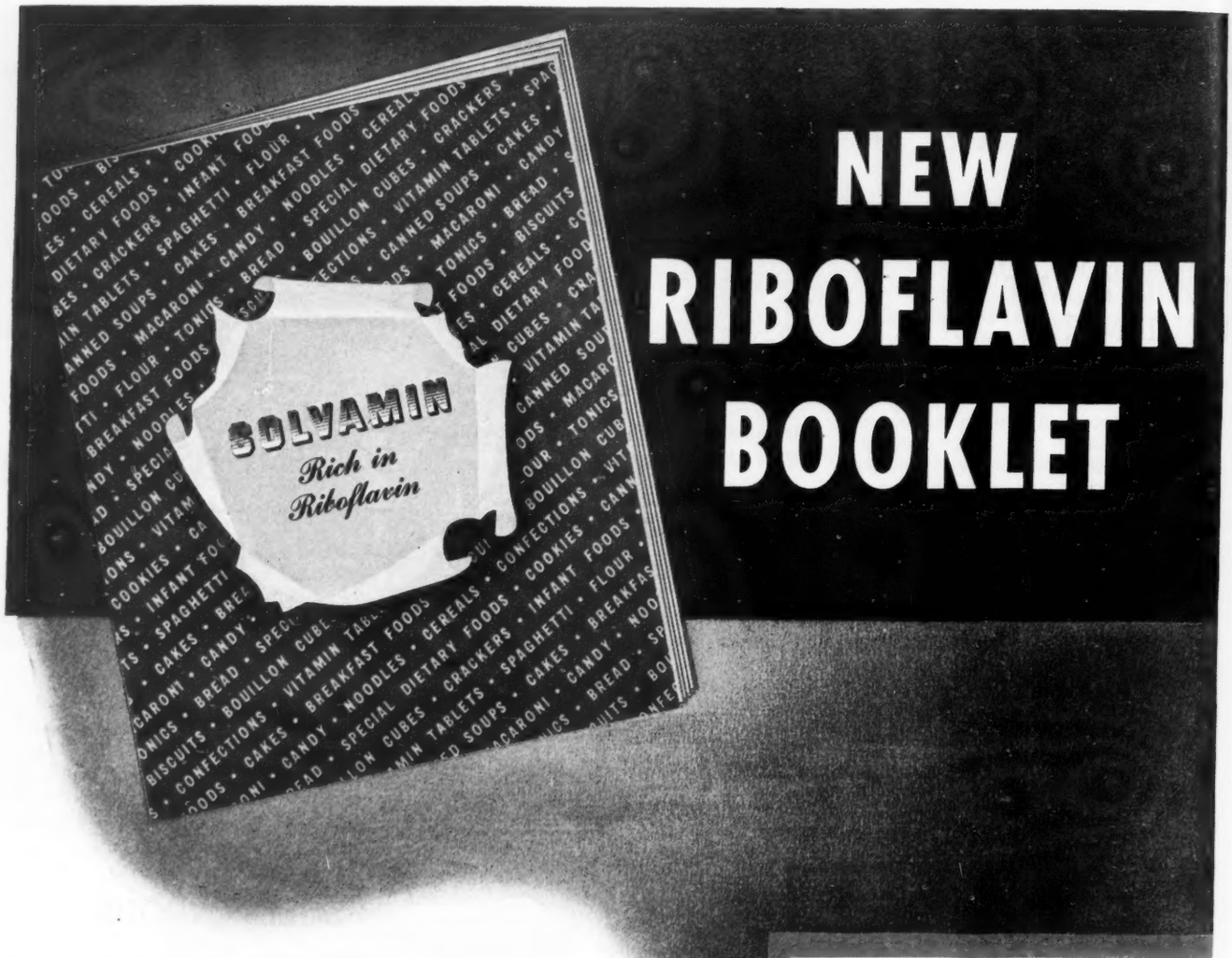
Defense–"Just Another Job" is the title of a 12-page illustrated booklet telling of the jobs done for National Defense by Link-Belt Co., 307 No. Michigan Ave., Chicago, Ill.

Diesel Power–"Power for Industrial Plants" is the title of an eight-page illustrated bulletin describing the application of Caterpillar diesel engine generator sets to the supply of industrial power in manufacturing plants, issued by Caterpillar Tractor Co., Peoria, Ill.

Piping Pointers–"How To Keep Your Plant Going Without Interruption" is the title of the first of series of folders, designed to help users get the maximum from their piping installations, to be issued by Crane Co., Chicago.

Processing Equipment – Equipment and complete plants for process industries, including such operations as distillation, extraction, blending, mixing, stirring and so on, are discussed in illustrated bulletin No. 1830, published by Blaw-Knox Co., Pittsburgh, Pa.

Vibration Dampeners–Various types of "Vibro-Insulators," devices of metal and rubber used for dampening vibrations and noise, are described in Catalog Section 7,900, an illustrated bulletin of B. F. Goodrich Co., Akron, Ohio.



NEW RIBOFLAVIN BOOKLET

. . . Contains Valuable Information for the Food Industry

You will want a copy of this new booklet about Solvamin—a rich, natural source of Riboflavin for the food industry. The booklet also discusses the importance of this vitamin in the human diet.

The many favorable characteristics of Solvamin have created a demand for this product which greatly exceeds our present plant capacity. We regret our inability to accept additional business at this time, but we are more than glad to supply information and samples to manufacturers who are planning for the future.

COMMERCIAL SOLVENTS
Corporation
17 East 42nd Street, New York, N. Y.

Covers These Subjects

- Riboflavin . . . What Is It?
- The Human Need for Riboflavin
- Typical Vitamin Assay on Solvamin
- Characteristics of Solvamin
- Chemical Analysis of Solvamin
- Questions and Answers

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Please send me a copy of your new booklet, "Solvamin—Rich in Riboflavin."

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FOOD TECHNOLOGY

NEW DISCOVERIES AND INVENTIONS

ENGINEERING

Bleach for Brewery Filter Mass

TREATMENT of filter mass with chloride of lime and carbon dioxide loosens the fibers, effects practical sterility and at the same time has a marked bleaching effect by liberating free chlorine and oxygen. After the customary preliminary wash carbon dioxide is introduced into the filtering apparatus from below. The chloride of lime is then added either in powder form, or if very lumpy, suspended in water. The dosage is calculated in percent active chlorine based on the total solution in the washer, 0.01 to 0.04 percent being sufficient.

The excess carbon dioxide converts the insoluble calcium carbonate formed during the reaction into soluble calcium bicarbonate which is washed out when the mass is rinsed. Optimum temperature for this treatment is 30 to 40 deg. C. By reducing the mechanical strain on the fiber the life of the filter mass is prolonged.

Digest from "A New Method for Treating Brewery Filter Mass," by J. Pauly and H. Wellhoener. *Wochschr. Brau.*, Vol. 57, 266, 1940 (Published in Germany).

Continuous Method For Manufacturing Bread

AN IMPROVED method for the continuous manufacture of bread is possible in which the dough is handled by automatic machinery from the mixer through several stages to the oven and then baked. The unfermented bread dough first passes from the mixer to the hopper of an extruding machine. From the extruding machine the dough is fed in a continuous strip on a belt or conveyor which travels through a fermentation chamber. The fermentation chamber is of sufficient length to allow the continuous strip of dough to ferment in the desired manner. Suitable temperature and relative humidity controls are employed so as to provide the correct atmospheric conditions. The dough passes from the fermentation chamber to a forming mechanism which is constructed so that the dough is also kneaded. After the dough is formed into the desired shape, it is deposited, usually on wax paper, after which it travels through the final steam proofer and oven where it is baked.

Digest from U. S. Patent 2,253,770 (granted to James T. Duffy, Jr., York, Pa., August 26, 1941).

Apparatus for Treating Oils

A NEW method has been announced that involves the use of a continuous rather than the ordinary batch process for refining animal and vegetable oils containing free fatty acids.

This improved process involves warming the crude oil, if necessary, and then passing it and the alkali solution, in proper proportion, to a zone in which they are intimately admixed. From this zone the mixture flows continuously to a second zone in which it is heated to the desired temperature while being gently but thoroughly agitated. It is then continuously discharged through a centrifugal separator in which refined oil is separated from the soaps formed.

The present process likewise involves, from the apparatus standpoint, the means for carrying out the process described and, in particular, a normal type of two-speed agitator in which the continuously flowing mixture of oil and acids is subjected to two types of agitation.

Digest from U. S. Patent 2,249,263, granted to George Frederick Wheelwright, Jr., Westfield, N. J., on July 15, 1941.

DAIRY PRODUCTS

New Method Of Preparing Cheese

A NEW process has been announced for the preparation of pasteurized cheese. In this process the matted or Cheddared unsalted curd is allowed to cure. Then the curd is blended with aged cheese, according to the flavor of the aged cheese. The blend is milled and then mixed with salt, water and an emulsifying salt.

The cured curd is usually very acid, and therefore it is necessary to neutralize the blend by adding tri-sodium phosphate. This cheese is thoroughly mixed and then is pasteurized at temperatures ranging from 135 to 145 deg. F. At this point the cheese reaches a condition and can be easily packaged.

In the new process it is necessary to blend only aged cheese to obtain uniformity, thus simplifying the operation to a marked degree. In the regular method of preparing pasteurized cheese, there are three variables present which present more of a complicated problem. These variables consist of blending fresh cheese, intermediate cheese and aged cheese.

Digest from U. S. Patent 2,251,496, granted to Clinton H. Parsons, Chicago, Ill., on August 5, 1941.

Plasticizing Cheese

PLASTICIZING cheese can now be accomplished by using plasticizing substances possessing nutriment, instead of a chemical ingredient of the type that is more commonly used. The cheese plasticizing material consists of an edible oil (corn, butter, cotton, peanut, cottonseed), rice flour and water. These three ingredients are thoroughly mixed and then subjected to an elevated temperature between 140 deg. and 200 deg. F. for a period sufficient to create a uniform cheese emulsifying material. This method provides a nutritious food composition to serve as a cheese emulsifier that renders the casein and olein constituents of cheese miscible incident to the pasteurization of cheese. The emulsion is added to finely ground cheese, together with sufficient water to give the proper moisture content. The resulting cheese product is then ready for final emulsification and pasteurization.

Digest from U. S. Patent, 2,252,170 (granted to Henry H. Doering, Chicago, Ill., on August 12, 1941).

Treatment of Milk Waste

LARGE quantities of liquid whey are produced as waste products during the manufacture of casein, cottage cheese, rennet cheese and similar materials derived from milk. Disposal also has to be made of excess buttermilk obtained from the manufacture of butter. Frequently, excess amounts of skim milk have to be thrown away.

According to U. S. Patent 2,254,241 (granted to Ernest E. Pittman and Robert R. Bottoms, Louisville, Ky., on September 2, 1941), a method has been developed that serves the dual purpose of removing from the milk waste one or more useful byproducts and at the same time reducing the problem of waste disposal. It has been found that the whey contains about 7 percent total solids suitable for use as a soluble feed or ingredients of feed for poultry or livestock. Objects of this process include the recovery of milk sugar, alcohol and lactic acid and the reduction of the solid content of the milk waste so as to reduce the problem of disposal of such waste. This method employs the new and important use of an inexpensive precipitation agent for accomplishing these several objects.

PACKAGING

Paraffining Paper Milk Containers

EXPERIMENTS have been made on the bactericidal effect of paraffining paper milk containers. *Esch. coli* was used as a test organism and the work was directed toward obtaining the temperature and time combination of paraffining required to produce sterility. The thermal resistance of the strain of *Esch. coli* was such that a skim milk culture in sterile skim milk showed a 99 percent reduction at 140 deg. F. for 20 minutes, the temperature and time combination taken as lethal for the most heat resistant pathogens transmissible through milk supplies. The work was therefore directed toward determining the temperature and time combinations of paraffining required to produce a 99 percent reduction of the strain of *Esch. coli* that was used. Since paraffin is an anhydrous material, the moisture content of the paperboard at the time of paraffining is a factor in the bacterial reductions obtained. A mean 99 percent reduction of the *Esch. coli* test organisms due to paraffining was obtained in about 10 seconds at 180 deg. F., 20 seconds at 175 deg. F., 35 seconds at 170 deg. F., 2 minutes at 165 deg. F. and 4 minutes at 160 deg. F. These results indicate the greater mean bactericidal efficiency of the higher paraffin temperatures used. If the paraffining process is to serve as the bactericidal treatment for the surfaces of the paper container, the use of the higher temperatures studied appears essential unless the immersion times generally used are considerably increased. If the use of the higher paraffin temperatures is impracticable, it may be necessary to subject the containers to separate bactericidal and waterproofing treatment or provide means for increasing the bactericidal effects of paraffining.

Digest from "Bactericidal Effect of the Paraffining of Paperboard Used for Paper Milk Containers," by Frederick J. Moss, Robert C. Thomas and Mildred K. Havens, *Public Health Reports*, May 2, 1941, p. 944-956.

BEVERAGES

Faulty Bottles May Cause Beer Sediment

AT RARE occasions an unusual type of sediment occurs in bottled pasteurized beer. The suspended matter, which never amounts to more than a few milligrams per bottle, consists of small, lustrous, iridescent crystals or extremely fine flat and filmy particles, some of which may curl up in form of a scroll, thus taking on the appearance of minute rods.

Micro- and spectrographic analyses revealed that the sediment consists of minute, extremely thin flakes or laminae of glass; as such, it is insoluble in ordinary strong acids and alkalies, but dissolves readily in hydrofluoric acid.

These particles as well as parts of the interior walls of bottles in which this sedimentation was found stained readily with methylene blue. In case of affected bottles, similar blue flakes of glass could be removed mechanically from the stained surface. Normal bottles do not stain with methylene blue. Little is known about the causes for this condition; very old bottles, prolonged contact of the bottles with the soaker solution or a too highly concentrated alkali solution in the soakers may be contributing factors.

Digest from Laboratory Case Reports, "Glass off the Bottle Wall," *Wallerstein Laboratories Communications*, Vol. 4, 131, August, 1941.

Effect of Sunlight on Beer

ALL beverages, including beer, are subject to photochemical effects on exposure to sunlight. Brewers are mainly concerned with those photochemical reactions in which volatile, odorous compounds are formed producing the characteristic "sunstruck" (skunky) flavor. Since beer is a complex mixture of many constituents, the action of light is complicated, the net effect depending not only upon the composition of the beer but also upon environmental conditions and time factors.

Data presented indicate that these odorous compounds are chiefly a mixture of relatively simple sulfhydril bodies (mercaptans) which are formed by the action of light on other, more complex, odorless sulphur compounds.

By means of a "spot" test on lead acetate paper the effect of sunlight on beer can be measured.

The presence of air in the bottle or traces of copper in the beer tend to inhibit the development of "sunstruck" flavor, while the addition of cystine or sulphites tends to enhance it. It is believed that the precursors of these odorous compounds enter the beer via the yeast during or after fermentation.

By applying the "spot" test to beer exposed to selected portions of the sunlight spectrum in different colored bottles it was found that the active radiations of sunlight as transmitted by the bottle are in the blue, violet and near ultraviolet regions of the spectrum. This confirms the long known practical observation that amber bottles are superior in protective action.

Digest from "The Action of Sunlight on Beers," by P. P. Gray, I. Stone and H. Rothchild, *Wallerstein Laboratories Communications*, Vol. 4, 29, April, 1941.

GRAINS

Acids from Hydrolyzed Oat Hulls

KOJIC and xylonic acids can be produced by fermentation from the acid hydrolyzate of oat hulls. For kojic acid the hydrolyzed hulls are fermented with *Aspergillus flavus*, which ferments the xylose liberated from oat hulls by mild acid hydrolysis. Pure xylose solutions gave higher yields of kojic acid than did oat hull sirup. Xylonic acid is formed by fermenting oat hull sirup with *Penicillium chrysogenum*. In this case the yield of acid is larger from oat hull sirup than from xylose solution; namely, 52.9 percent instead of 25.8 percent, calculated on the sugar consumed in the fermentation. Kojic and xylonic acids are potentially useful industrial products offering opportunities for utilizing a waste product from processing oats. Another possibility for utilizing the acid hydrolyzate (oat sirup) is to mix it with corn mash used in producing butyl alcohol and acetone by fermentation. As much as half of the total carbohydrate can be derived from oat hulls without sacrificing yields in this large scale industrial fermentation process, although oat hull sirup alone yields hardly any butyl alcohol and acetone under like conditions. Still another possibility is to ferment oat hull

sirup with *Aerobacter aerogens* to produce ethyl alcohol and 2,3-butyleneglycol, but trials indicate that oat hull sirup is not equivalent to pure xylose in this fermentation. The principal opportunities are therefore in producing kojic acid, xylonic acid or butyl alcohol and acetone.

Digest from "Production of Chemicals by Fermenting Acid Hydrolyzate of Oat Hulls," by Morton M. Rayman, *Iowa State College Journal of Science*, Vol. 16, 122, 1941.

Quick Tempering of Wheat

By use of a wetting agent it has been proven experimentally that the tempering time of wheat can be reduced from a long period of time to two to three hours.

Experimentally, the procedure is to determine the moisture content of the wheat, then clean and weigh a 2,000-gram sample of wheat. A table is made indicating the correct number of milliliters to be added to a given weight of wheat at any moisture content to bring the moisture level to 15 percent. The sample is shaken thoroughly with the added water in an airtight, screw-top glass container, and when tempered sufficiently long it is milled.

For quick tempering, a one-tenth solution of sodium dioctyl sulfosuccinate is used in place of the ordinary tap water used for tempering.

Digest taken from "Quick Tempering of Wheat for Experimental Milling," by Mr. B. Sullivan, *Cereal Chemistry*, Vol. 18, September, 1941, p. 695.

FATS & OILS

Rancidity in Bacon Fat

The relative tendency for bacon sides to become rancid is primarily an inherent characteristic of the product. The observed variations show little relation to processing factors or to the properties of the lean meat in the bacon. Samples of Wiltshire bacon fat from 22 Canadian packers were used in making the tests. In judging rancidity five chemical tests were compared; namely, determining peroxide oxygen, free fatty acid, Kreis number, aldehyde, water-soluble matter and redox potential. The peroxide oxygen and Kreis tests are most suitable for estimating rancidity. For reasons not yet understood, the free fatty acid content of bacon sides proved to be significantly different only with the smoked fat, whereas, differences from factory to factory were significantly large both in unsmoked and smoked fat. Variations in lipolytic microorganisms may cause the differences

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between factories, but in any case the free fatty acid content was low enough to suggest that it is not normally an important cause of spoilage.

Digest from "Methods for Investigating Rancidity, Their Interrelation and Application to Bacon Fat," by W. Harold White, *Canadian Journal of Research*, Vol. 19D, 278, 1941 (Published in Canada).

Shortening Stabilization

ONE of the newer methods employed in the stabilization of shortenings is based upon the discovery that the tendency of fats and oils to become rancid and to develop a positive Kreis test can be retarded by treatment with hydroxy monobasic aliphatic acids. This permits the stabilization of fats and oils against rancidity without in any way affecting the characteristic flavor of the shortening.

There are a number of edible fats and oils that can be stabilized against rancidity using this method. Some of these include lards, beef fat, hydrogenated cottonseed oil, palm oil, soybean oil, and other vegetable and animal fats, oils and mixtures thereof.

This method is particularly directed to the employment of monobasic sugar acids as antioxidents. Effective stabilization of lard may be obtained by the addition of less than 0.1 percent of monobasic sugar acid.

Digest taken from U. S. Patent 2,251,485. Granted to Donald T. Greppie, Chicago, Ill., on Aug. 5, 1941.

MISCELLANEOUS

Disinfecting With Hypochlorite

THE agent which actually does the work in disinfecting containers or equipment with hypochlorites is not free chlorine, nor the hypochlorite ion, but undissociated hypochlorous acid. It has been found that bacterial spores are especially suitable for quantitative studies of bactericidal potency, and a method has been developed for preparing suspensions of *Bacillus metiens* spores for the purpose. The method is an important aid to disinfection studies because the suspensions are easy to prepare and handle, and remain constant in resistance to hypochlorite for several months.

Quantitative studies made by this method showed that germicidal action has two stages. The first is cell penetration, which causes a considerable time lag. The second is the death phase, which is relatively rapid. The principal factors governing germicidal

potency are concentration, reaction (pH) and temperature. Concentration of available chlorine is a criterion of germicidal activity only when the other factors remain constant. At higher alkalinities than pH 8 the effects of temperature and concentration are overshadowed by the influence of pH in that a slight increase in pH causes a large increase in killing time. Below pH 8 this influence is much smaller. Each temperature increase of 10 deg. in the range from 20 to 50 deg. C. decreases killing time by 40 to 60 percent. In estimating the efficacy of disinfectants for sterilizing utensils it is therefore important not to rely on available chlorine content. The temperature must be considered, and the solution must be adequately buffered against becoming too alkaline.

Digest from "Factors Affecting the Germicidal Efficiency of Hypochlorite Solutions," by A. S. Rudolph and Max Levine, Bulletin 150. Iowa Engineering Experiment Station, Ames, 1941.

Blackening of Potato Tubers After Boiling

IT HAS been shown that the black coloration which appears in some potato tubers after boiling cannot be melanin, as the color disappears rapidly in acid solution at about pH 3.0; at this pH melanin is quite stable. The bleached pigment appears to be soluble in acid solution but the gray coloration partially reappears on neutralizing the acid with buffer solution at pH 7.0.

The pigment was found to develop as well after heating in alcohol as in water, but in neither case did it appear until oxygen was admitted. Attempts to isolate the gray pigment from boiled potato failed, but led to the suspicion that the pigment might be an iron compound. Blackening tubers contained in every case upon analysis more iron than the normal ones.

Though much remains to be done, it is suggested, as a tentative hypothesis, that in raw tubers the black pigment exists in the form of ferrous iron bound in a loose complex, possibly in combination with proteins. This complex is hydrolyzed on boiling and the iron is then precipitated as a colorless ferrous compound, probably the hydroxide, which is gradually oxidized to the black oxide as air penetrates to the tissues. Although as yet supported by no direct evidence, this theory fits not only the facts established in the present work, but also a number of hitherto unrelated observations of other workers in the same field. However, further experiments must be preformed.

Digest from "Blackening of Potato Tubers on Boiling," by Ursula M. Robison, *Nature*, June 21, 1941, pp. 777–778 (Published in England)

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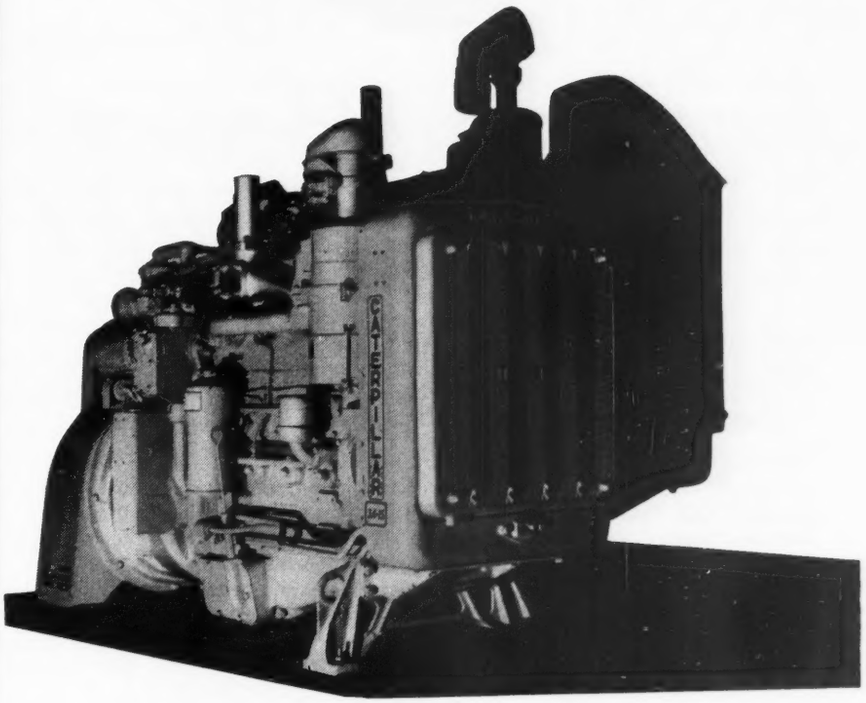

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Processed Cheese

(*Continued from page 55*)

the loaves was costly and occupied a lot of floor space. Today these wrappers are used in the same manner as tin foil was formerly. With foil becoming more and more scarce for packaging purposes, the use of transparent wrappings represents a saving to the cheese processor. Also, previous efforts to use a transparent wrapper did not permit drawing direct from the kettle as could be done when tin foil was used. That meant worrying about the cost of the filling machine. Today at least one firm is using a filling machine that cost only a few hundred dollars and is fairly satisfactory.

Considerable worry about mold between the wrapper and the cheese has occurred in the past. Today firms are packing their cheese with no more worry than if foil were used. The air and equipment in the packaging room are sprayed and washed with hypochlorite solutions to kill and remove mold and yeast spores. That practice keeps fungus inoculation of the cheese to an almost negligible degree.

Only a very few years ago we thought equipping a plant to make processed cheese quite costly. Recently machinery for several plants has been installed at a cost of less than $2,000. Now, with rising costs of materials and shortages in construction metals, it is impossible to make an estimate on an installation cost.

The usual packages range from ½ to 5 lb. in net weight. The wrapper may be of tin or aluminum foils or transparent membranes, and the containers may be foil- or transparent membrane-lined paper cartons or wooden boxes. The 2- and 5-lb. box or loaf sizes are the market counterpart of the daisies or wheels of the bulk American or cheddar cheese popularly known as "store cheese."

How Eggs Are Dried

(*Continued from page 52*)

lots have a considerable number of undesirable eggs, but, with the candling and the smelling operations a satisfactory pack is obtained. The buckets must be cleaned after each day's work, and, all told, the method looks rather clumsy.

It is said that, when the rainy season comes in the Middle West, about 50 percent of the eggs coming into the candling room will be dirty. The Government is going to insist that these eggs be washed before breaking. If the usual method of hand washing is

employed, it will be necessary to break these eggs soon afterward or they will deteriorate very fast.

On the Pacific Coast, for the past 15 years, both wet and dry sand blast cleaning methods have been used for large quantities of eggs. The most repulsive, heavy dirty eggs can be cleaned at a rate of 50 to 100 cases per hour with sand and water, using a phenol compound in the water to prevent subsequent rot. It is the custom to clean these eggs and put them into cartons.

It would seem that this type of equipment could be used in the breaking room. Eggs could be fed from cases to a conveyor passing through a sanding machine. Close to the discharge end of this machine, candling lights could be placed below the conveyor. One candler could pick out the dirty eggs, with eggs passing at the rate of 50 cases per hour. The conveyor would continue between the rows of breakers. As this conveyor returns through the sander it is automatically cleaned.

If this industry is to expand in the next few months, the old, backward methods must be discarded. The Surplus Marketing Administration has no standards for bacteria count as yet, although it has been stated that this may be necessary. We can be sure that SMA, in collaboration with the Department of Agriculture, will insist on high quality dried eggs. Let us hope that, by producing a high quality product, the demand at home will be such that, after the present emergency is over, the dried egg industry will continue in the United States.

What Do You Mean, pH?

(*Continued from page 67*)

tions which might form precipitates or unusual color compounds with the indicator solutions. In general, the accuracy or preciseness of colorimetric measurements may not be as great as that of the electrometric procedures. In many cases, the precision of the colorimetric procedure may not extend beyond 0.1 to 0.2 pH.

In cases where colorimetric methods for the determination of pH cannot be used, or where more precise measurements are required, even though the time required to make such measurements may be somewhat longer, the electrometric method in some of its modifications is utilized. Developments in electrometric measurements of pH in recent years have greatly simplified the procedure from a process which was in some instances difficult for the physical chemist to one which may be utilized to some extent for control work by plant foremen entirely unacquainted with chemistry. Utilizing the glass electrode, compact portable instruments are available from several companies which can be utilized for rather precise measurement of pH, and the measurements may be carried out in rather rapid succession. However, such pH measurements should be under the supervision of, and should be frequently checked by, well-trained chemists to insure that they maintain their accuracy. It follows, of course, that such instruments should never be used for research work by those untrained in chemistry who do not understand the principles and fundamentals of pH and its measurement, even though these instruments may be used by those untrained in chemistry for control work under supervision.

Polyphase Freezer

(*Continued from page 62*)

sity of Texas, March 13, 1941, nine of the food items were quick frozen in polyphase water-sugar medium. The guests were requested to grade the flavor of each item as "superior," "normal" or "inferior," and also, to describe any unusual flavor which might be noted. No information was divulged as to the source or processing of any food item. Table I shows the results of this test. Some score cards had no grades for certain foods, while a few indicated two grades. The fractions tabulated indicate this double grading. It is significant that only four diners were able to discern sweetness in the broiled pork tenderloin, and of this number, two stated that the flavor, for this reason, was improved. Two score cards indicated that both asparagus and snap beans were too sweet, but one of those also graded the sweet potato, a fresh item, as too sweet. Upon the basis of this test and of many others, it is believed that general acceptance may be secured for nearly all foods frozen and protected by the polyphase sugar-water media.

The new freezing unit will be described in January.—THE EDITORS.

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BOOKS

Reservoir of Information

CHEMICAL ENGINEERS' HANDBOOK. Second Edition. John H. Perry, editor. Published by McGraw-Hill Book Co., Inc., 330 West 42d St., New York, N. Y., 1941. 3029 pages, 5¼x7¾ in.; cloth. Price, $10.

Probably no other single book contains as much information useful to the practical food technologist as does this one. It is not a handbook for the laboratory chemist, but was edited for those who put chemistry to work in plant processes—who combine chemistry with engineering. As such, it is useful in a practical way to those directing food plant operations.

In addition to the material that one might expect to find in a book on chemical engineering, there are sections on drying; mixing; mechanical separations; crushing, grinding and pulverizing; measurement and control of process variables; materials of construction; movement and storage of materials; power generation and mechanical power transmission; refrigeration; electricity and electrical engineering; safety and fire protection; heat transmission; flow of fluids; evaporation; humidification, dehumidification and cooling towers and spray ponds.

The other sections are as follows: Mathematical tables and weights and measures; mathematics; physical and chemical data; indicators, qualitative analysis, catalysis and organic chemistry; physical and chemical principles; gas absorption and solvent extraction; adsorption; distillation and sublimation; high-pressure technic; electrochemistry, economic factors in chemical plant location; accounting and cost finding; and reports and report writing.

As in the first edition, the material is in concise form, and for convenience is divided into 29 sections identified by thumb tabs. Then there is a 71-page index to facilitate the finding of any particular bit of information.

Heat of Respiration

CALORIMETRIC MEASUREMENTS OF THE HEAT OF RESPIRATION OF FRUITS AND VEGETABLES. By W. P. Green, W. V. Hukill and D. H. Rose. Published by U. S. Department of Agriculture as Technical Bulletin 771. 1941. 22 pages; 5¾x9¼ in.; paper. Price, 5 cents; for sale by Superintendent of Documents, Washington, D. C.

Because the amount of heat generated by the life processes of fresh plant material is important in determining the amount of refrigeration necessary for properly storing or precooling a product, the data in this bulletin are of practical value in the food industries. The measured heats of respiration varied from 2,480 B.t.u. per ton-day for one sample of apples to 43,920 for one sample of peas. The results of the heat-of-respiration measurements are presented in tabular form, and much of the bulletin is taken up with a discussion of how the measurements were made.

All About Milling

STUDIES IN PRACTICAL MILLING. By Edgar S. Miller. Published by The Miller Publishing Co., 118 South Sixth St., Minneapolis, Minn., 1941. 618 pages; 6½x9¾ in.; cloth. Price, $6.

It is not enough to say that this is the most comprehensive textbook on milling ever compiled. For perhaps equally important is the fact that the material is presented in a style which makes the information easy to understand.

This is a textbook designed to acquaint the reader with what is being done, and why, in every phase of the milling industry. It was compiled from lesson material prepared for the correspondence course in practical milling conducted jointly by Dunwoody Industrial Institute and the publishers of *The Northwestern Miller*. This course was taken not only by milling superintendents and head millers, but by others interested in gaining an understanding of production problems in the milling industry.

There are 48 chapters in the book, starting with Mathematics and Numerals and running the gamut of the various phases of practical milling to Maintaining Purity in Mill Products. The chapters are well illustrated with pictures and drawings which help to give the reader a quick comprehension of the subject under discussion.

More About Vitamins

WE NEED VITAMINS. By Walter H. Eddy and C. G. Hawley. Published by Rheinhold Publishing Corp., 330 West 42d St., New York, N. Y., 1941. 102 pages; 7½x5¼ in.; cloth. Price $1.50.

The increased importance of enriched foods in the American diet makes this a valuable handbook on vitamins for the food manufacturer. Written by a leading authority on vitamins, the book gives the chemical structure, food sources and functions of vitamins A, B, C, D, E, K and P, including a complete chapter on vitamin B complex.

PATENTS

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Fruit Handled in Treating Machine so as to Expose Selected Portion for Treatment at Predetermined Location—Percy Jepsou, to Pacific Machinery Co., San Francisco, Calif. No. 2,257,341. Sept. 30, 1941.

Sugar Beets Fed From Open-bottom Hopper to Higher Level by Conveying and Elevating Belt With Horizontal Leg Designed to Restrict Feed to Less Than Maximum Elevating Capacity of Cooperating Belts—Harold F. Silver, Denver, Colo. Nos. 2,257,351 and 2,257,352. Sept. 30, 1941.

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Acidity and Soluble Metallic Impurities of Acid Beverages and Wines Reduced by Zeolite Treatment—William D. Ramage, Berkeley, Calif. No. 2,258,216. Oct. 7, 1941.

Margarine, Butter and the Like Mechanically Molded Into Desired Shape and Size Units by Forcing Through Restricted Throat Into Mold Form Equipped with Air-vent Valve—Kenneth G. Heft, Earl J. Rapp and Lynn O. Dority, to Morris Packaging Equipment Co., Toledo, Ohio. No. 2,258,288. Oct. 7, 1941.

Fruit Graded for Size on Quickly Adjustable Mechanism—George P. Marsden, Riverside, and Ernest A. Verinder, Redlands, Calif., to Food Machinery Corp., San Jose, Calif. No. 2,258,460. Oct. 7, 1941.

Flavoring Material Preserved Against Change of Character by Inclusion in Gelatin—Chester H. Epstein, Highland Park, and Nathan R. Gotthoffer, Grayslake, Ill., to Grayslake Gelatin Co., Grayslake, Ill. No. 2,258,567. Oct. 7, 1941.

Fruits, Nuts and the Like Added to Ice Cream Mix During Freezing in Continuous Manner by Mechanical Means—Arthur W. Farrall, Wilmette, Ill., and Rodney L. Hanson, Chicago, to Creamery Package Mfg. Co., Chicago, Ill. No. 2,258,645. Oct. 14, 1941.

Fish Oils, Fish Liver Oils and Concentrates Containing Fat-soluble Vitamins Heated With Sugar at Between 100 and 200 Deg. C. for Removal of Objectionable Tastes and Odors—Loran O. Buxton, Belleville, N. J., to National Oil Products Co., Harrison, N. J. No. 2,258,671. Oct. 14, 1941.

Fish Liver Oils Treated With Formaldehyde Vapors at Between 110 and 175 Deg. C. in Inert-gas Atmosphere and Under Reduced Pressure to Remove Undesirable Tastes and Odors—Loran O. Buxton and Howard B. Colman, Belleville, N. J., to National Oil Products Co., Harrison, N. J. No. 2,258,672. Oct. 14, 1941.

Oils and Fats Subjected to Edible Gum Treatment at Between 100 and 200 Deg. C. for Removal of Objectionable Tastes and Odors—Loran O. Buxton, Belleville, N. J., to National Oil Products Co., Harrison, N. J. No. 2,258,673. Oct. 14, 1941.

Water for Carbonated Beverages Automatically and Continuously Cooled to 36 Deg. F. and Charged With 4 Parts by Volume of CO_2 During Passage Through Upright Enclosed Tank—Harry G. Mojonnier, Oak Park, Ill., to Mojonnier Bros. Co. No. 2,259,263. Oct. 14, 1941.

Cracker and Biscuit Doughs Manually Folded and Stacked After Passage Through Sheeter in Dough-breake Machine, Mechanically Conveyed to Rear of Sheeter and Mechanically Elevated for Repassage Through Sheeter—Edward H. Strubbe and Michael J. Colacurcio, Cincinnati, to United Biscuit Co. of America, Chicago. No. 2,259,398. Oct. 14, 1941.

Loaves of Bread Directed Into and Away From Reciprocating Slicers by Set of Rolls Operating Through Vertical Plane at Each End of Loaves and Through Horizontal Plane Above Loaves—Phil G. Schlemmer, Nanuet, N. Y., to American Machine & Foundry Co. No. 2,259,427. Oct. 14, 1941.

Cereal in Granular Particle Form to Pass Through From 10 to 40 Mesh Screen Mineralized by Treatment With Plurality of Simultaneously Precipitated Mineral Salts Having Particle Size of Less Than 200 Mesh—Howard J. Billings, Acton, Mass., to Cream of Wheat Corp., Minneapolis, Minn. No. 2,259,543. Oct. 21, 1941.

Complex Protein- and Carbohydrate-containing Raw Vegetable Boiled in Dilute Acid Solution at Atmospheric Pressure, Cooled, Subjected to Pepsin Action, Neutralized and Freed From Undigested Residue to Improve Digestibility and Vitamin and Mineral Food Value—Scott Henry Perky and Carlos L. Crum, Dayton, Ohio. No. 2,259,582. Oct. 21, 1941.

Sugar Beet Roots Freed From Small Stones and the Like and Cut Into Slices During Passage Through Feeder With Perforated Bottom and Rotary Cylinder Having Longitudinal Openings on Outer Shell Fitted With Removable and Adjustable Knives—Walter H. Hanni, Spanish Fork, Utah, and John W. McFarland, Sugar City, Idaho, to Utah-Idaho Sugar Co., Salt Lake City, Utah. No. 2,259,689. Oct. 21, 1941.

Vitamin A-, B_1-, and C-containing foods Treated With Nickel Salt to Produce More Than 0.1 Percent Nickel Pectinate Content to Increase Assimilability of Vitamin Without Destroying Colloidal and Dispersible Characteristics of Pectin—Philip Bliss Myers, Scarsdale, N. Y., to Sardik, Inc., Jersey City, N. J. No. 2,259,767. Oct. 21, 1941.

Cereals Puffed In Gun Having Rotatable Barrel Carrying Means for Igniting Combustible Mixture Discharging From Burners Positioned in Space Between Gun Barrel and Surrounding Jacket—Henry S. Crosby, Long Lake, Minn., and Thomas P. Ring, Buffalo, N. Y., to General Mills, Inc. No. 2,259,802. Oct. 21, 1941.

Canadian Patents

Garlic Removed From Cereals by Hulling and Cracking Grain to Coarse Meal and Passing Meal Between Pair of Tangential Surfaces Rotating in Opposite Directions; One or Both Surfaces Grooved Peripherally to Facilitate Separation of Cracked Grain From Garlic—Chas. Meneux and Louis Chausse, Nantes, France, and Sylvain G. Bourdin, Angers, France. No. 399,894. Oct. 7, 1941.

Butter Packaged in Boxes Lined With Sheet Material Formed in Single Folded Blanks to Enclose Sides of Butter Block, With Folded Overlapping Flaps Enclosing Ends; Flaps Spaced at Fold Lines to Enclose Corners—Raymond W. Everitt, Toronto, Ont., to Aluminum Laboratories, Ltd., Montreal, Quebec. No. 399,920. Oct. 14, 1941.

Egg Substitute Made by Boiling Flaxseed With Water to Extract Oil, Straining and Adding Jellying Agent and Coloring Matter or Preservative to Extract as Required—Frederick E. May, Christchurch, New Zealand. No. 400,056. Oct. 21, 1941.

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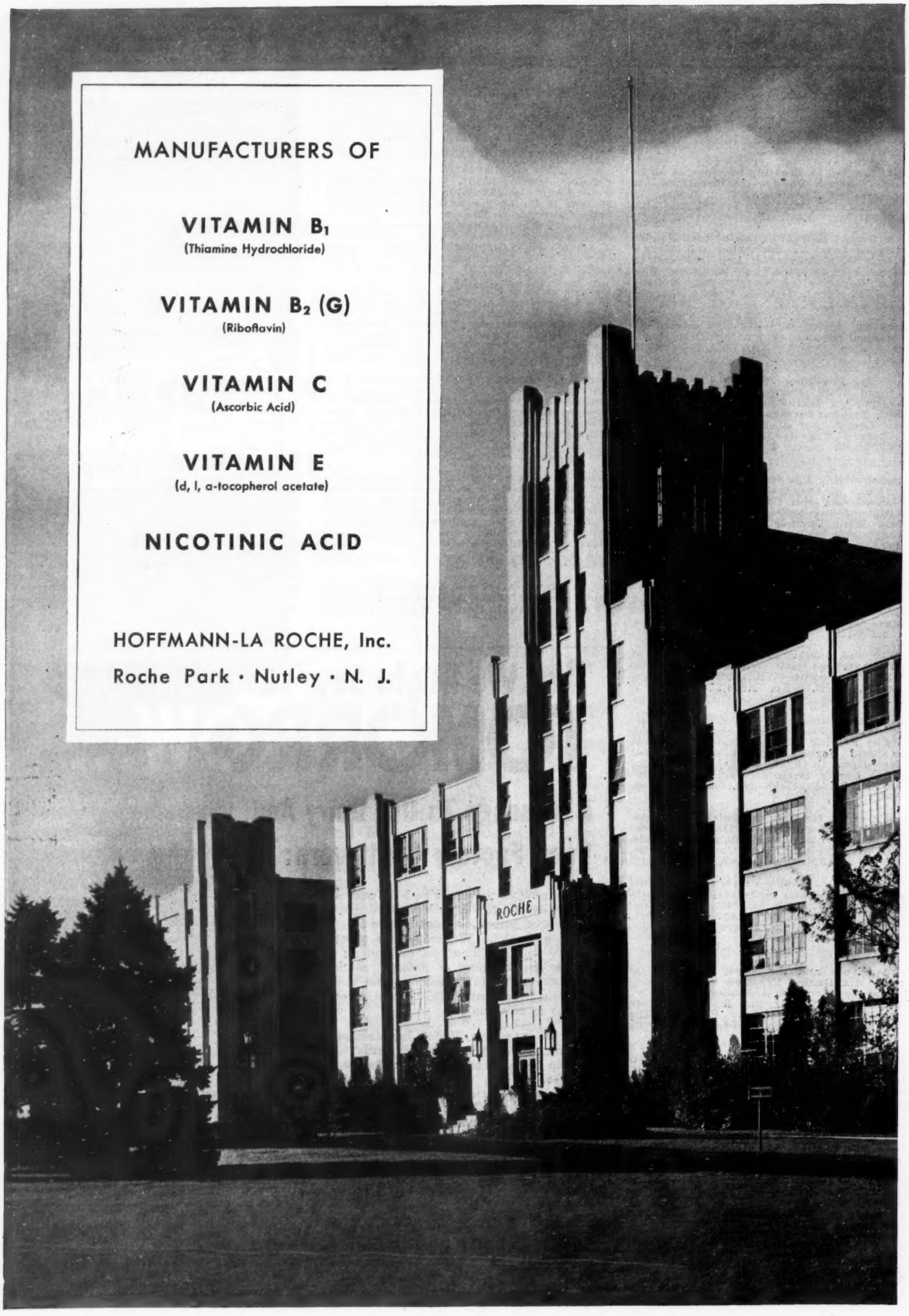
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FORMULAS FOR FOODS

FORMULA NO. 251

Christmas Pudding

Beef suet	10 lb.
Whole-wheat bread	10 lb.
Almonds	2.5 lb.
Mixed spice (clove, cinnamon)	1 oz.
Nutmeg	1.5 oz.
Salt	0.5 oz.
Seeded raisins	10 lb.
Candied orange peel	2.5 lb.
Candied lemon peel	2.5 lb.
Candied citron peel	2.5 lb.
Currants	10 lb.
Seedless raisins	5 lb.
Eggs	6 lb.
Honey	5 pt.
Milk	2.5 pt.
Sherry	2.5 pt.

Mixing Directions

Put beef suet, whole-wheat bread and almonds through fine grinder and add spices and salt. Then run seeded raisins and candied peel through coarse grinder. Beat eggs, add honey, milk and sherry. Then mix this with the ground beef suet, whole-wheat bread and almonds. Add the ground seeded raisins and candied peel. Now add currants, seedless raisins, nutmeg, mixed spice and salt. Stir thoroughly.

Fill into bowls flush with rim. Lay cotton cloth on top of bowl, tie under rim with string. Then tie opposite corners of cloth in knots over top. Boil (or steam in steamer), taking care water does not rise over rim of bowl. Boil or steam for 6 hours. When wanted, boil or steam 2 hours.

FORMULA NO. 252

Anchovy Paste

Anchovies	112 lb.
Butter	18 lb.
Salt	2½ oz.
White pepper	4 oz.
Curry powder	1 oz.
Nutmeg	½ oz.

Split and bone the anchovies and pass through mincing machine. Mix well with the other ingredients, adding first the flavoring material, then the binder (if used) and finally the fat. Reduce mixture to a smooth paste by passing through a mincing machine, edge-runner or colloid mill. Fill into containers and sterilize at 240 deg. F. for a time, depending on size of container. The product may be cheapened by using a binder in the form of rice. The rice (preferably coarse granulated) is added to water in a steam-pan (100 lb. rice to 280 lb. water) and boiled for 30 minutes. Addition must be made slowly, uniformly and with continuous stirring. Cut jelly into blocks and cool rapidly, preferably in cold, filtered air stream.

Formula from H. B. Cronshaw, London, England. Republication rights reserved.

FORMULA NO. 253

Coconut Taffy Bar

(For hand- or wire-cut deposit)

Light brown sugar	5 lb.
Water (variable)	3 lb.
Macaroon coconut	6 lb.
Molasses	3 lb.
Corn sirup	8 oz.
Invert sugar	8 oz.
Shortening	2 lb. 8 oz.
Soda	2 oz.
Salt	2 oz.
Vanilla extract	1 oz.
Cake flour	9 lb.

Mixing Directions

Place light brown sugar and 2 lb. of water in machine bowl. Run at low speed until sugar is thoroughly dissolved. Add macaroon coconut, molasses, corn sirup, invert sugar, shortening, soda, salt and vanilla extract to the sugar solution and cream well on second speed for about 5 minutes. Add remaining amount of water. If wire-cut machine is to be used, the amount of water is 1 lb. For hand deposit use 2 lb. 8 oz. at this stage. Now add cake flour and mix until smooth. Bake at 400 deg. F. for about 10 minutes.

FORMULA NO. 254

Light Muffins

Butter	5 lb.
Hydrogenated shortening	5 lb.
Fruit powdered sugar	19 lb.
Baking soda	1 oz.
Salt	7 oz.
Eggs	7 lb.
Top-quality special cake flour	38 lb.
Baking powder	2 lb.
Liquid milk	23 lb.
Vanilla extract	8 oz.

Add butter, shortening, sugar, soda and salt together and cream until moderately light—about 5 minutes on second speed. Add the eggs gradually. Cream on second speed until light and glossy. Blend the cake flour and baking powder and work one-third into egg mixture on low speed (2 minutes). Add the milk and vanilla in 2 parts, alternately, with remaining flour. Mix on low speed for 2 minutes. Batter temperature 65 to 75 deg. F. Oven temperature 400 to 425 deg. F. for small or shelf type and 425 to 450 deg. F. for large, loaded oven.

Formula from Brown's Hungarian Corp.

FORMULA NO. 255

Blueberry Muffins

Light muffin batter	80 lb.
Blueberries (fresh or frozen)	19 lb.
Flour for dusting	1 lb.

Directions

See Formula No. 254 for making the light muffin batter. Frozen blueberries should be used while partly frozen, to avoid drainage of juice. Dust with flour and fold into the batter. Deposit in muffin tins greased and floured, or lined with paper cups. Bake in a hot oven (425 to 450 deg. F.) for about 20 minutes.

Formula from Brown's Hungarian Corp.

FORMULA NO. 256

Gelatin Milk Dessert

Sugar	10 lb.
Gelatin	2 lb.
Salt	0.05 lb.
Fruit acid (citric or tartaric)	0.05 lb.
Flavor and color	

Mix ingredients thoroughly and package 3¼ oz. per package. Prepare dessert by dissolving the dry ingredients (3¼ oz.) in ¼ pint of hot water. Then mix ¾ pint of cold milk into the above solution.

Formula from U. S. Patent 2,253,614.

FORMULA NO. 257

Pop Corn Crisp

Open-kettle molasses	4 lb.
Sugar	3 lb.
Standardized invert sugar	1 lb.
Corn sirup	1 lb.
Pop corn	18 qt.
Coconut butter (861 deg. F. melting point)	4 oz.
Salt	1½ oz.
Spanish peanuts	1 lb.

Place the molasses, sugar and corn sirup into a kettle and cook to 290 deg. F. Add the peanuts and coconut butter and mix until the coconut butter is melted. Then add the pop corn and

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salt. Mix well, spread out on a cooler and roll into a thin sheet.

This crisp must be handled rapidly after being placed on the cooler, otherwise it will not be possible to get it thin enough.

Formula from Nulomoline Co.

FORMULA NO. 258

Spice Doughnuts

Flour (doughnut mix)	10 lb.
Cinnamon	¼ oz.
Allspice	¼ oz.
Cloves	½ oz.
Water	4 lb. 12 oz.

Mixing Directions

Blend by sifting together the doughnut mix, cinnamon, allspice and cloves. Place in machine bowl and add water. Mix for 30 seconds on low speed, scrape down; 30 seconds on low speed, scrape down; 90 seconds on second speed, scrape down. For minimum grease penetration, mix slightly longer than specified. Give batter a 10-minute floor time before frying. The finished dough should have a temperature between 70 and 75 deg. F. Fry at 370 to 375 deg. F.

Formula from General Food Sales Co. Inc.

FORMULA NO. 259

Coconut Macaroons

Water (hot)	3 lb.
Corn sirup	4 lb.
Granulated sugar	7 lb.
Macaroon coconut	6 lb. 8 oz.
Cornstarch	12 oz.
Salt	1 oz.
Egg whites	1 lb.
Baking powder	2 oz.

Mixing Directions

Have the water hot. Add corn sirup and sugar. Stir and heat to a full rolling boil.

Place coconut, cornstarch and salt in a machine bowl and give a few turns on low speed to blend. Pour in hot sirup and then mix 10 minutes on low speed. Add egg whites all at once and mix 1 minute on low speed. Add baking powder and finish by mixing 2 minutes on second speed. (These directions apply to a 3-speed machine. On a 4-speed machine, use second and third speeds, respectively.)

Scale pieces about 1 oz. (or from 6 to 12 oz. per dozen when using wire-cut machines). Deposit in paper-lined pans. Bake at about 400 deg. F. for 10 to 15 minutes, or until light brown. Do not overbake.

Production Suggestions

Let mixture cool to about 110 deg. F. before scaling. Use paper-lined sheet pans and deposit from plain or star tube, or drop from a size 40 ice cream dipper. In baking, avoid excess bottom heat. After baking, when cool, moisten back of paper with damp cloth or brush with water. Let stand about 5 minutes and macaroons will lift off easily.

If macaroons spread too much while baking, increase mixing time a little or use a cooler batter. Do not overmix. Overmixing gives a stiff batter which will not spread enough during baking.

Variety in finishing may be obtained by garnishing some of the macaroons with cherries and other candied fruits.

Formula from General Foods Sales Co., Inc.

FORMULA NO. 260

Kilties

Sugar (fine granulated)	3 lb.
Salt	½ oz.
All-purpose vegetable shortening	2 lb. 8 oz.
Butter	12 oz.
Vanilla	½ oz.
Whole eggs	9 oz.
Liquid milk	2 oz.
Ammonia	½ oz.
Chopped pecans	8 oz.
Cake flour (sifted)	4 lb. 8 oz.

Mixing Directions

Mix sugar, salt, shortening, butter and vanilla and cream for 7 minutes at low speed. Add the eggs in two portions during 5 minutes, creaming at low speed. Carefully dissolve the ammonia with milk; then add to creamed mixture and mix well. Stir in the pecans. Add the sifted flour last and mix it in for 1 minute at low speed. Drop out on ungreased pans using a No. 40 ice cream disher at 10 oz. per dozen. Top with a half-pecan that has been dipped in cold water. Bake lightly at 375 to 385 deg. F.

Formula from Lever Bros. Co.

FORMULA NO. 261

Maple Handroll Cream

Concentrated maple sirup (2½ fold)	2½ lb.
Granulated sugar	20 lb.
Water	2 qt.
Cream of tartar	¼ oz.
Invertase	½ oz.

Put all ingredients in a kettle with the exception of the invertase and cook to 242 deg. F. Pour on slab. Cool to 120 deg. F. Add invertase and beat to a fondant.

By varying the amount of invertase used, these centers may be "timed" for any degree of softness desired. They should be coated with a mild bittersweet or a vanilla coating of the semi-sweet variety.

Formula from Quebec Maple Sugar Producers.

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139	National Box & Lumber Co.	Carboy boxes.
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141	Pressed Steel Tank Co.	Metal containers.
142	Stokes and Smith Co.	Automatic Packaging machinery for making, filling and sealing dry products.
143	Syntron Co.	Jolters, Joggers and vibrators for filling dry materials into packages.
144	Aurelio Tanzi Engrg. Co.	Automatic packaging & wrapping machinery.
145	Triangle Package Mach. Co.	Volumetric package filling machinery; vibratory feed weighers.
146	Edwin L. Wiegand Co.	Package sealing hot plates.
147	Philadelphia Gear Works	Speed reducers; equipment for power drives.
148	Reeves Pulley Co.	Variable Speed Controls, drives and pulleys.
149	Stephens-Adamson Mfg. Co.	Ball-bearing pillow blocks and flange units.
150	Westinghouse Electric & Mfg. Co.	Electric motors—totally enclosed for hazardous locations.
151	Eastern Engineering Co.	Motors for mixing equipment.
152	Louis Allis Co.	Electric motors—all types and sizes.
153	General Electric Co.	Electric motors, fuses, breakers, appliances.
154	Abbe Engineering Co.	Sifters.
155	Amer. F'dry Equip't Co.	Dust Collectors.
156	Amer. Machine & Metals	Extractors.
157	Bird Machine Co.	Centrifugal Separators.
158	Fred S. Carver	Laboratory presses.
159	Combustion Engrg. Co.	Mechanical Air-separators.
160	Denver Equipment Co.	Vibratory Screens, Hydro-classifier; Flotation machinery.
161	Dorr Co., Inc.	Classifiers and Thickeners.
162	Fletcher Works, Inc.	Centrifugals.
163	S. G. Frantz Co., Inc.	Filters.
164	Graver Tank & Mfg. Co.	Water Conditioning Equipment.
165	Link-Belt Co.	Vibratory Screens.
166	Magnetic Engineering Co.	Magnetic and Vibratory Separators.
167	Newark Wire Cloth Co.	Wire cloth for screen and sieving.
168	Productive Equip't Corp.	Vibratory screens and units.
169	Robinson Mfg. Co.	Vibratory screens.
170	Claude B. Schneible Co.	Dust and Fume collectors.
171	Separations Engrg. Co.	Flotation Separators.
172	Sharples Corp.	Centrifuges—various types.
173	T. Shriver & Co.	Thickeners.
174	W. S. Tyler Co.	Woven wire screens; vibratory screens.
175	Products Corp.	Dry separators using Johnson electrostatic process.
176	W. A. Hammond Drierite Co.	Industrial Dryers.
177	National Carbon Co., Inc.	Electrostatic precipitators; heat exchanger tank linings, filters, diffusers, pipe, fittings, non-cor. pumps.
178	Walworth Co., Inc.	Valves, fittings, pipe and pipe wrenches.
179	Casein Co. of America	Glues, cements, casein.
180	Darco Corp.	Activated Carbon.
181	Carborundum Co.	Refractories; porous filters.
182	Williams Patent Crusher and Pulverizer Co.	Reduction and air. sep. mach. Hammer-mills.
183	American Resinous Pdts.	Resins, Waxes, Lacquers.
184	Charles Engelhard, Inc.	Controlling and measuring instruments.
185	Mixing Equipment Co.	Mixers.
186	Tri Clover Machine Co.	Pumps, tubing, pipe valves, pressure fittings.
187	Kimble Glass Co.	Glass apparatus.
188	New England Tank & Tower Co.	Continuous mixers, agitator drives.
189	J. M. Lehman Co., Inc.	Roller mills; grinding equipment.
190	Laboratory Furniture Co.	Laboratory furniture and equipment.
191	Bakelite Corp.	Plastics.
192	American Meter Co., Inc.	Orifice meters, gas displacement meters & regulators; Test meters.
193	Bemis Bro. Bag Co.	Burlap, Cotton and paper bags.
194	Chemicolloid Laboratories	Sanitary Colloid mill.
195	Marlo Co.	Mechanical Packings.
196	Borg-Warner Corp.	Jacketed Kettles.
197	Lancaster Iron Works, Inc.	Mixers.
198	St. Regis Paper Co.	Filling equipment; multi-wall paper bags.
199	Globe Steel Tubes Co.	Seamless Steel Tubes.
200	Economy Engineering Co.	Materials Handling Equipment.
201	Thos. A. Edison Inc.	Measuring & control instruments. Thermostats and Thermometers.
202	Haveg Corp.	Centrifugal Pumps, filter press plates, [illegible] condensers, exhausters, valves, fittings & floor coverings.
203	Air & Refrigeration Corp.	Air conditioning units.
204	Allis-Chalmers Mfg. Co.	Speed-changers; Low Head Sifters; Electrogals. Crushing, reduction, screening, sifting, washing, conveying equipment. Blowers, pumps, compressors, solvent extraction motors and water treating equipment.
205	Cleveland Worm & Gear Co.	Speed reducers.
206	Globe Steel Tubes Co.	Pressure, alloy and process tubing.
207	International Nickel Co.	Monel, Nickel, Inconel, Nickel Alloys.
208	Pittsburgh Equit. Meter Co.	Liquid meters, gas meters, gas regulators.
209	Reineveld Corp.	Centrifugal filters and separators.
210	John A. Roebling's Sons	Filter wire cloth, industrial wire cloth, wire rope, insulated wire and cables, flat & round wire.
211	E. H. Sheldon & Co.	Laboratory furniture.
212	Hills-McCanna Co.	Glass-lined valves and pumps.
213	Waukesha Foundry Co.	Sanitary corrosion-resistant pumps; corrosion resistant castings.
214	Wallace & Tiernan Prod.	Microbiological control equipment for process and cooling water; small diaphragm type reciprocating pumps.
215	Lukens Steel Co.	Nickel-clad steel, Inconel-clad steel & Monel-clad steel.
216	Oliver United Filters	Filters, diaphragm, acid-handling pumps.
217	American Engineering Co.	Electric Hoists.
218	Black-Sivalls & Bryson	Pressure relief safety devices.
219	Hercules Powder Co.	Chemicals, Chlorinated Rubber.
220	Carpenter Container Co.	Corrosion Resistant Fibre Containers.
221	Jay Bee Sales Co.	Hammer Mills, lab. and industrial sizes.
222	Pioneer Rubber Co.	Neoprene Gloves.
223	Elmer and Amend	Refractometers, mobilometers, electropods, electrophotometers; quality control instruments.
224	Sowers Mfg. Co.	Mixers.

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